

## Flame-retardant, adhesive-lined heat-shrinkable tubing (extended temperature range)

Adhesive-lined ES2000 heat-shrinkable tubing is specifically designed to meet automotive industry requirements for environmental sealing and electrical insulation of automotive wire splices, terminations, and components.

ES2000 tubing has an outer jacket of radiation-crosslinked, semirigid polyolefin. Flame-retardant and mechanically tough, the jacket provides strain relief and abrasion

protection of wire splices and mechanically sensitive components. The inner layer of the tubing is a unique hot-melt adhesive, specially formulated to adhere to all major types of automotive wire insulation and to perform well at an extended temperature range. The adhesive forms an effective barrier against automotive fluids and moisture, helping to protect the harness from the effects of corrosion and water wicking.

Because ES2000 tubing has a high shrink ratio, only a few sizes are needed to cover a wide range of splice and component diameters. ES2000 tubing dimensions have been engineered to provide low-cost sealing solutions on multiple-wire splices (up to seven wires per side), using standard Tyco Electronics application equipment.

### Temperature rating

|                                   |                |
|-----------------------------------|----------------|
| Full recovery temperature:        | 135°C          |
| Continuous operating temperature: | -40°C to 130°C |

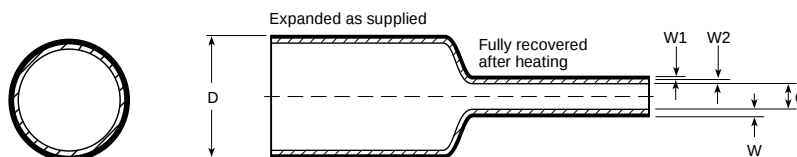
### Specifications\*



| Type   | Raychem | UL     |
|--------|---------|--------|
| ES2000 | RT-1112 | E85381 |

\*When ordering, always specify latest issue.

### Dimensions (millimeters/inches)



| Part number | Inside diameter (including core)    |                                        | Recovered wall thickness** |                              |                                |  |
|-------------|-------------------------------------|----------------------------------------|----------------------------|------------------------------|--------------------------------|--|
|             | D (min.)<br>Expanded<br>as supplied | d (max.)<br>Recovered after<br>heating | W<br>Minimum<br>total wall | W1<br>Minimum<br>jacket wall | W2<br>Minimum<br>adhesive wall |  |
| ES2000-No.1 | 5.72 0.225                          | 1.27 0.050                             | 1.20 0.047                 | 0.64 0.025                   | 0.56 0.022                     |  |
| ES2000-No.2 | 7.44 0.293                          | 1.65 0.065                             | 1.52 0.060                 | 0.76 0.030                   | 0.76 0.030                     |  |
| ES2000-No.3 | 10.85 0.427                         | 2.41 0.095                             | 1.91 0.075                 | 0.89 0.035                   | 1.02 0.040                     |  |
| ES2000-No.4 | 17.78 0.700                         | 4.45 0.175                             | 2.41 0.095                 | 1.04 0.041                   | 1.37 0.054                     |  |

\*\*Wall thickness will be less if tubing recovery is restricted during shrinkage.

### Ordering information

|                      |                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------|
| Color                | Black                                                                                         |
| Size selection       | Consult manufacturer's recommended size selection guidelines.                                 |
| Standard packaging   | Cut pieces. See reverse for information on standard cut lengths.                              |
| Marking              | Tubing will be marked with the number size (for example, ES-1, ES-2, ES-3, or ES-4).          |
| Ordering description | Specify product name, size, color, and cut length; for example, ES2000-No.2-0-50MM (0=Black). |

## Specification values

|                           | Property                                   | Unit                 | Requirement                                      | Method of test |
|---------------------------|--------------------------------------------|----------------------|--------------------------------------------------|----------------|
| <b>Material</b>           | Dimensions                                 | mm ( <i>inches</i> ) | See reverse                                      | ASTM D 2671    |
|                           | Longitudinal change                        | percent              | 0 to -10                                         | ASTM D 2671    |
|                           | Tensile strength                           | psi ( <i>MPa</i> )   | 1500 ( <i>10.3</i> ) minimum                     | ASTM D 2671    |
|                           | Ultimate elongation                        | percent              | 250 minimum                                      | ASTM D 2671    |
|                           | Secant modulus at 2% (expanded)*           | psi ( <i>MPa</i> )   | 20,000 ( <i>137</i> ) minimum                    | ASTM D 2671    |
|                           | Heat shock<br>(4 hours at 225°C/437°F)     |                      | No dripping, flowing or cracking of outer jacket | ASTM D 2671    |
|                           | Dynamic cut through                        | pounds ( <i>kg</i> ) | 30 ( <i>13.6</i> ) minimum                       | ASTM D3032     |
|                           | Volume resistivity                         | ohm-cm               | 1.0 X 10 <sup>12</sup> minimum                   | ASTM D 2671    |
|                           | Flammability                               |                      | Self-extinguishing within 30 seconds             | See note below |
| <b>Splice performance</b> | Current leakage                            | microamps            | 0.25 maximum                                     | See note below |
|                           | Room temperature flex test                 |                      |                                                  | See note below |
|                           | Current leakage                            | microamps            | 0.25 maximum                                     |                |
|                           | Thermal shock                              |                      |                                                  | See note below |
|                           | Current leakage                            | microamps            | 0.25 maximum                                     |                |
|                           | Low-temperature flexibility                |                      |                                                  | See note below |
|                           | Dielectric withstand<br>1 minute at 1000 V |                      | No breakdown                                     |                |
|                           | Heat aging                                 |                      |                                                  | See note below |
|                           | Current leakage                            | microamps            | 0.25 maximum                                     |                |
|                           | Fluid immersion                            |                      |                                                  | See note below |
|                           | Current leakage                            | microamps            | 0.25 maximum                                     |                |
|                           | Swell                                      | percent              | 50 maximum                                       |                |

Note: Consult Raychem RT-1112 for specific details about test procedures.

\*Calculate based on wall thickness of jacket only.

## Standard cut lengths

| Part number  | Standard cut length            | Cut length tolerance  |
|--------------|--------------------------------|-----------------------|
| ES2000-No. 1 | 27 mm, 50 mm, 65 mm<br>1220 mm | ± 1.5 mm<br>± 25.4 mm |
| ES2000-No. 2 | 27 mm, 50 mm, 65 mm<br>1220 mm | ± 1.5 mm<br>± 25.4 mm |
| ES2000-No. 3 | 27 mm, 65 mm, 75 mm<br>1220 mm | ± 1.5 mm<br>± 25.4 mm |
| ES2000-No. 4 | 27 mm, 75 mm, 90 mm<br>1220 mm | ± 1.5 mm<br>± 25.4 mm |

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## Users should independently evaluate the suitability of the product for their application.

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