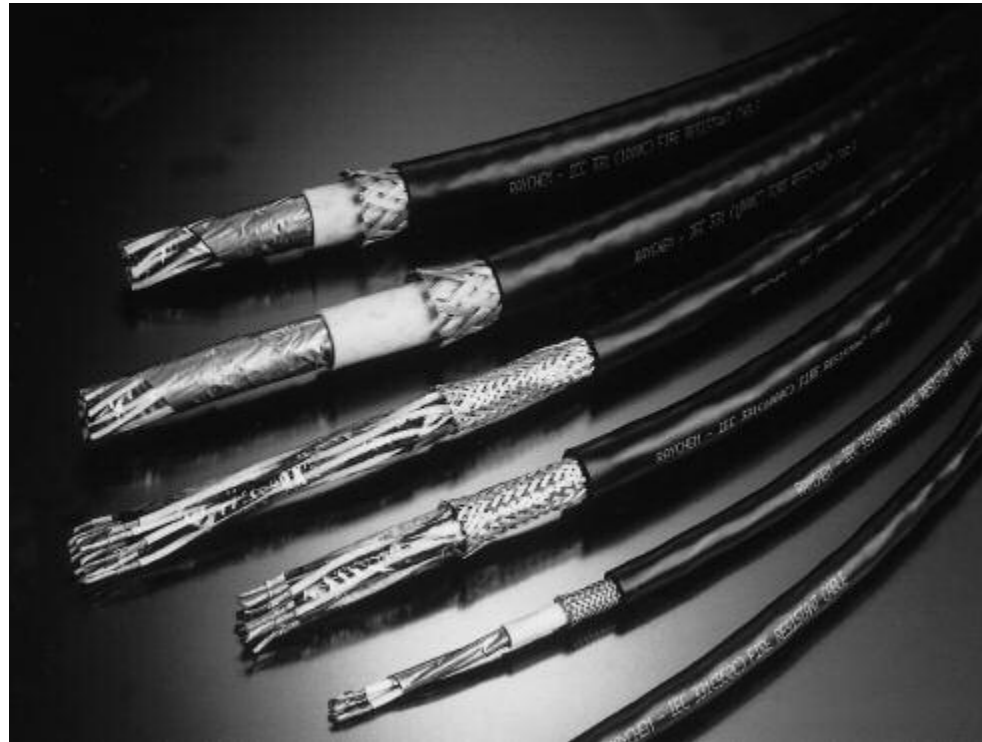


Halogen-Free, Fire Resistant Cable Range

Product Facts

- Highly flame retardant
- Halogen-free
- Low smoke generation
- Low toxicity index
- Low acid gas emission
- Low water uptake
- Compatible with Raychem System 100 heat-shrink components, heat-shrink tubing, molded parts and adhesives

FR-1000



Applications

Tyco Electronics has developed a new halogen-free, lightweight, small size, fire resistant Raychem cable to exceed the exacting fire resistant requirements of IEC 60331 (ie withstands 950°C [1742°F] for 3 hours as opposed to the 750°C [1382°F] requirement) and meet the flame-retardant requirements of IEC 60332-3 (Cat A), while maintaining significant size and weight savings over conventional materials.

FR-1000 cable consists of Raychem Type 95 primary wire with a Zerohal jacket and can be used throughout the installation, simplifying the selection for designers and electrical engineers. By a combination of our proven expertise in polymer and radiation chemistry, low fire hazard technology and precision extrusion capability,

Tyco Electronics has been able to develop a range of Raychem cables featuring reduced size and weight over existing thickwall cables. This offers savings of approximately 30% and optimizes the space available. This results in lower installed costs by downsizing connectors, glanding, cable support structures, and reduced time on installation.

With increasing complexity of electronic systems, sensors, communications and safety equipment, more cables are required to fit into smaller spaces. FR-1000 small size cable can offer distinct advantages over conventional cables.

These include:

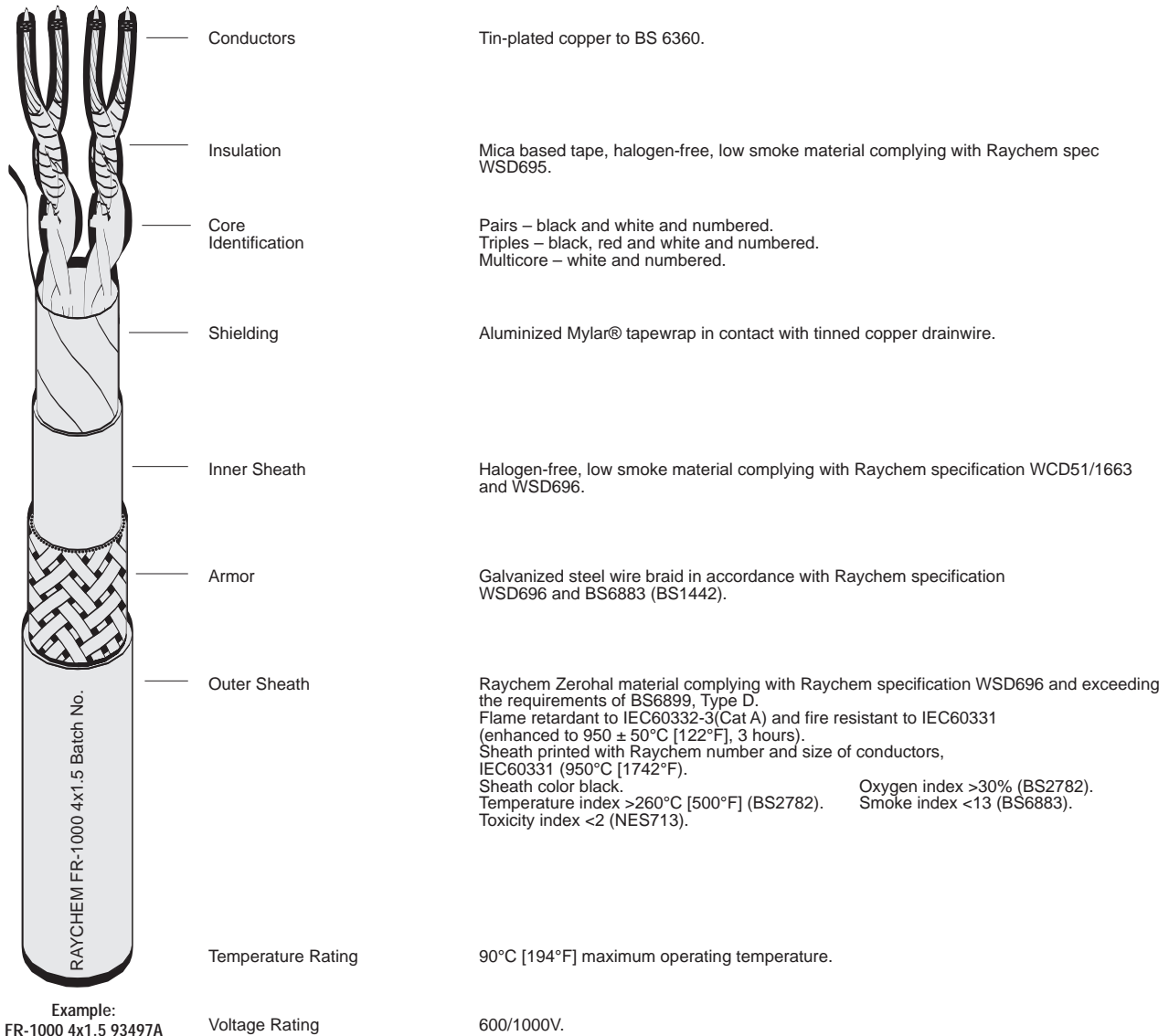
- Tough and flexible constructions aiding installation through smaller bend radii and extending service life.
- Controlled dimensions simplifying connector and transit selection.
- Resistance to widely used fluids such as diesel fuels, oils, and greases.

**Operating Temperature Range**

-30°C to +90°C  
[-22°F to +194°F]

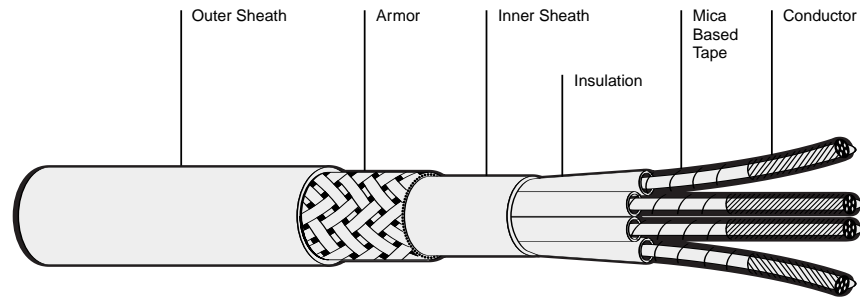
| Available in: | Americas | Europe | Asia Pacific |
|---------------|----------|--------|--------------|
|               | ■        | ■      | ■            |

Generic Cable Construction



MYLAR is a trademark of Dupont Teijin Films U.S.

FR-1000 (Continued)



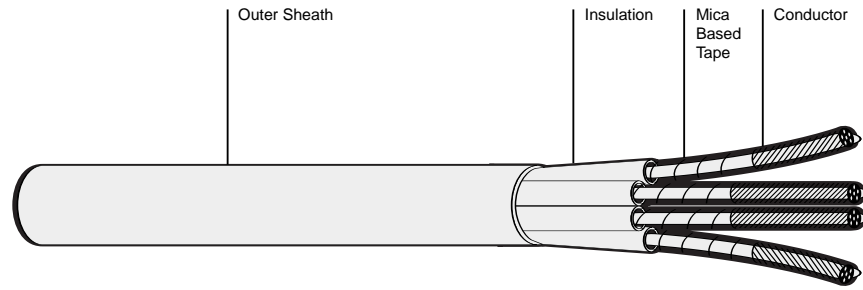
FR-1000 Multicore Control Cables, Unshielded, Armored, 600/1000V\*

Selection Table

| Part No.<br>EPD | Construction | Conductor<br>Stranding | CSA<br>Nominal<br>mm <sup>2</sup> | Diameter<br>Over<br>Inner<br>Sheath | Cable             |              |      | Nominal<br>Weight<br>kg/km | Jacket<br>Color |
|-----------------|--------------|------------------------|-----------------------------------|-------------------------------------|-------------------|--------------|------|----------------------------|-----------------|
|                 |              |                        |                                   |                                     | Outer<br>Diameter |              |      |                            |                 |
|                 |              |                        |                                   |                                     | (min.)            | (max.)       |      |                            |                 |
| 87486A          | 2x1.5        | 19/0.32                | 1.5                               | 6.6 [.260]                          | 10.2 [.402]       | 11.2 [.441]  | 178  | Black                      |                 |
| 87488A          | 3x1.5        | 19/0.32                | 1.5                               | 7.1 [.280]                          | 10.8 [.425]       | 11.6 [.457]  | 203  | Black                      |                 |
| 87490A          | 4x1.5        | 19/0.32                | 1.5                               | 7.7 [.303]                          | 11.2 [.441]       | 12.4 [.488]  | 236  | Black                      |                 |
| 87492A          | 7x1.5        | 19/0.32                | 1.5                               | 9.4 [.370]                          | 13.0 [.512]       | 14.4 [.567]  | 328  | Black                      |                 |
| 87494A          | 12x1.5       | 19/0.32                | 1.5                               | 12.5 [.492]                         | 16.0 [.630]       | 17.6 [.693]  | 486  | Black                      |                 |
| 87496A          | 19x1.5       | 19/0.32                | 1.5                               | 14.7 [.579]                         | 18.2 [.717]       | 20.2 [.795]  | 677  | Black                      |                 |
| 87498A          | 27x1.5       | 19/0.32                | 1.5                               | 17.9 [.705]                         | 21.3 [.839]       | 23.5 [.925]  | 906  | Black                      |                 |
| 87487A          | 2x2.5        | 7/0.67                 | 2.5                               | 7.7 [.303]                          | 11.2 [.441]       | 12.4 [.488]  | 224  | Black                      |                 |
| 87489A          | 3x2.5        | 7/0.67                 | 2.5                               | 8.2 [.323]                          | 11.7 [.461]       | 12.9 [.508]  | 257  | Black                      |                 |
| 87491A          | 4x2.5        | 7/0.67                 | 2.5                               | 9.0 [.354]                          | 12.6 [.496]       | 14.0 [.551]  | 312  | Black                      |                 |
| 87493A          | 7x2.5        | 7/0.67                 | 2.5                               | 10.9 [.429]                         | 14.7 [.579]       | 15.7 [.618]  | 429  | Black                      |                 |
| 87495A          | 12x2.5       | 7/0.67                 | 2.5                               | 14.6 [.575]                         | 18.1 [.713]       | 20.1 [.791]  | 661  | Black                      |                 |
| 87497A          | 19x2.5       | 7/0.67                 | 2.5                               | 17.5 [.689]                         | 20.9 [.823]       | 23.1 [.909]  | 936  | Black                      |                 |
| 87499A          | 27x2.5       | 7/0.67                 | 2.5                               | 21.1 [.831]                         | 25.3 [.996]       | 27.3 [1.075] | 1321 | Black                      |                 |

\*Cables are armored with an overall galvanized steel wire braid armor.

FR-1000 (Continued)



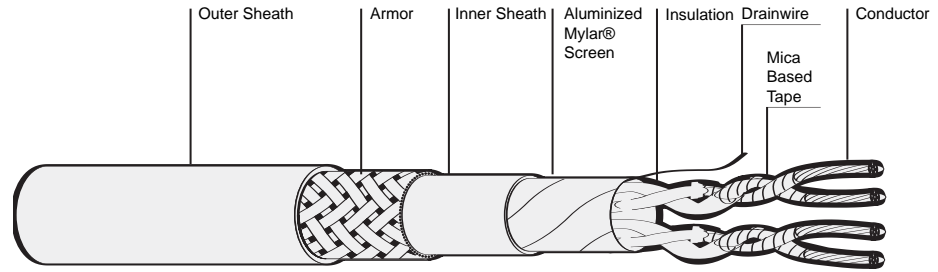
FR-1000 Multicore Control Cables, Unshielded, Unarmored, 600/1000V

Selection Table

| Part No.<br>EPD | Construction | Conductor<br>Stranding | CSA<br>Nominal<br>mm <sup>2</sup> | Outer Diameter |             | Cable<br>Nominal<br>Weight<br>kg/km | Jacket<br>Color |
|-----------------|--------------|------------------------|-----------------------------------|----------------|-------------|-------------------------------------|-----------------|
|                 |              |                        |                                   | (min.)         | (max.)      |                                     |                 |
|                 |              |                        |                                   | 87472A         | 2x1.5       |                                     |                 |
| 87474A          | 3x1.5        | 19/0.32                | 1.5                               | 7.8 [.307]     | 8.6 [.339]  | 108                                 | Black           |
| 87476A          | 4x1.5        | 19/0.32                | 1.5                               | 8.4 [.331]     | 9.2 [.362]  | 134                                 | Black           |
| 87478A          | 7x1.5        | 19/0.32                | 1.5                               | 10.1 [.398]    | 11.1 [.437] | 204                                 | Black           |
| 87480A          | 12x1.5       | 19/0.32                | 1.5                               | 13.3 [.524]    | 14.3 [.563] | 332                                 | Black           |
| 87482A          | 19x1.5       | 19/0.32                | 1.5                               | 15.2 [.598]    | 16.8 [.661] | 490                                 | Black           |
| 87484A          | 27x1.5       | 19/0.32                | 1.5                               | 18.5 [.728]    | 19.9 [.783] | 684                                 | Black           |
| 87473A          | 2x2.5        | 7/0.67                 | 2.5                               | 8.4 [.331]     | 9.2 [.362]  | 122                                 | Black           |
| 87475A          | 3x2.5        | 7/0.67                 | 2.5                               | 8.8 [.346]     | 9.8 [.386]  | 150                                 | Black           |
| 87477A          | 4x2.5        | 7/0.67                 | 2.5                               | 9.7 [.382]     | 10.7 [.421] | 192                                 | Black           |
| 87479A          | 7x2.5        | 7/0.67                 | 2.5                               | 11.5 [.453]    | 12.7 [.500] | 288                                 | Black           |
| 87481A          | 12x2.5       | 7/0.67                 | 2.5                               | 15.1 [.594]    | 16.7 [.657] | 475                                 | Black           |
| 87483A          | 19x2.5       | 7/0.67                 | 2.5                               | 17.9 [.705]    | 19.7 [.776] | 720                                 | Black           |
| 87485A          | 27x2.5       | 7/0.67                 | 2.5                               | 21.3 [.839]    | 23.5 [.925] | 995                                 | Black           |

|                     |  |
|---------------------|--|
| Conductors          | Tin plated copper to BS6360  |
| Insulation          | Mica based tape, halogen-free, low smoke material complying with Raychem specification WSD695  |
| Core Identification | White and numbered   |
| Inner Sheath        | Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WSD696  |
| Armor               | Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442)  |
| Outer Sheath        | Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D<br>Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 +/- 50°C [122°F], 3 hours)<br>Sheath printed with number and size of conductors, IEC331, Raychem, voltage rating and EPD number<br>Sheath color black<br>Oxygen index >30% (BS2782), Temperature index > 260°C (BS2782),<br>Smoke index <13 (BS6883)<br>Toxicity Index <2 (NES713) |
| Temperature Rating  | 90°C [194°F] maximum conductor operating temperature   |
| Voltage Rating      | 600/1000V  |

Halogen-Free, Fire Resistant Cable Range



FR-1000 Multipair Control Cables, Collectively Shielded and Armored 600/1000V\*

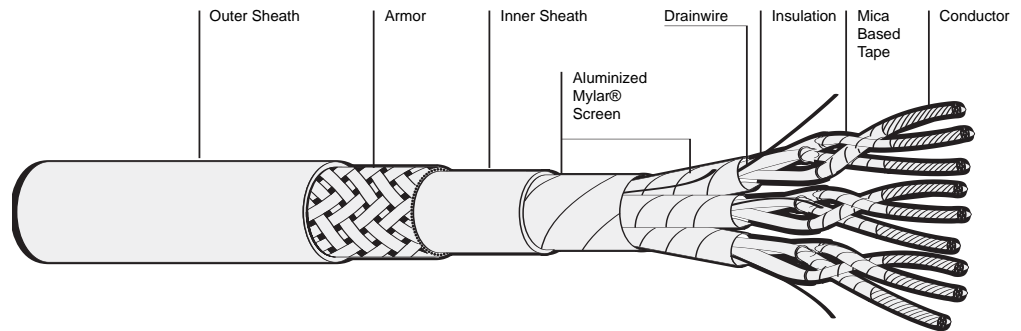
Selection Table

| Part No.<br>EPD | Construction | Conductor<br>Stranding | CSA<br>Nominal<br>mm <sup>2</sup> | Diameter<br>(Nominal) |                         | Cable             |              |                            |                 |
|-----------------|--------------|------------------------|-----------------------------------|-----------------------|-------------------------|-------------------|--------------|----------------------------|-----------------|
|                 |              |                        |                                   | Over<br>Shield        | Over<br>Inner<br>Sheath | Outer<br>Diameter |              | Nominal<br>Weight<br>kg/km | Jacket<br>Color |
|                 |              |                        |                                   |                       |                         | (min.)            | (max.)       |                            |                 |
| 93491A          | 3x2x0.75     | 19/0.23                | 0.75                              | 9.7 [.382]            | 11.1 [.437]             | 14.6 [.575]       | 16.2 [.638]  | 319                        | Grey            |
| 93492A          | 7x2x0.75     | 19/0.23                | 0.75                              | 13.1 [.516]           | 14.6 [.575]             | 18.1 [.713]       | 20.1 [.791]  | 484                        | Grey            |
| 93493A          | 12x2x0.75    | 19/0.23                | 0.75                              | 16.4 [.646]           | 18.1 [.713]             | 21.5 [.846]       | 23.7 [.933]  | 685                        | Grey            |
| 93494A          | 20x2x0.75    | 19/0.23                | 0.75                              | 21.2 [.835]           | 23.0 [.906]             | 26.8 [1.055]      | 29.6 [1.165] | 1090                       | Grey            |
| 87500A          | 2x1.5        | 19/0.32                | 1.5                               | 5.4 [.213]            | 6.7 [.264]              | 10.7 [.421]       | 11.3 [.445]  | 192                        | Black           |
| 87501A          | 2x2x1.5      | 19/0.32                | 1.5                               | 7.2 [.283]            | 8.6 [.339]              | 12.3 [.484]       | 13.5 [.531]  | 267                        | Black           |
| 87502A          | 3x2x1.5      | 19/0.32                | 1.5                               | 11.2 [.441]           | 12.7 [.500]             | 16.1 [.634]       | 17.9 [.705]  | 404                        | Black           |
| 87503A          | 5x2x1.5      | 19/0.32                | 1.5                               | 13.8 [.543]           | 15.3 [.602]             | 18.8 [.740]       | 20.8 [.819]  | 541                        | Black           |
| 87504A          | 7x2x1.5      | 19/0.32                | 1.5                               | 15.2 [.598]           | 16.9 [.665]             | 20.3 [.799]       | 22.5 [.886]  | 649                        | Black           |
| 87505A          | 10x2x1.5     | 19/0.32                | 1.5                               | 17.5 [.705]           | 19.2 [.756]             | 22.5 [.886]       | 24.9 [.980]  | 817                        | Black           |
| 87506A          | 12x2x1.5     | 19/0.32                | 1.5                               | 19.0 [.748]           | 20.7 [.815]             | 25.2 [.992]       | 26.6 [1.047] | 999                        | Black           |
| 87507A          | 20x2x1.5     | 19/0.32                | 1.5                               | 24.7 [.972]           | 26.5 [1.043]            | 30.5 [1.201]      | 33.7 [1.327] | 1541                       | Black           |
| 87508A          | 24x2x1.5     | 19/0.32                | 1.5                               | 26.6 [1.047]          | 28.6 [1.126]            | 33.6 [1.323]      | 35.6 [1.402] | 1762                       | Black           |

\*Cables have an overall aluminized Mylar® shield with drainwire and an overall galvanized steel wire braid armor.

MYLAR is a trademark of Dupont Teijin Films U.S.

FR-1000 (Continued)



FR-1000 Multitrip control cables,  
Collectively Shielded and Armored, 600/1000V\*

Selection Table

| Part No.<br>EPD | Construction | Conductor<br>Stranding | CSA<br>Nominal<br>mm <sup>2</sup> | Diameter<br>(Nominal) |                         | Cable             |              |                            |                 |
|-----------------|--------------|------------------------|-----------------------------------|-----------------------|-------------------------|-------------------|--------------|----------------------------|-----------------|
|                 |              |                        |                                   | Over<br>Shield        | Over<br>Inner<br>Sheath | Outer<br>Diameter |              | Nominal<br>Weight<br>kg/km | Jacket<br>Color |
|                 |              |                        |                                   |                       |                         | (min.)            | (max.)       |                            |                 |
| 87509A          | 1x3x1.5      | 19/0.32                | 1.5                               | 5.9 [.232]            | 7.2 [.283]              | 10.7 [.421]       | 11.9 [.469]  | 216                        | Black           |
| 87510A          | 3x3x1.5      | 19/0.32                | 1.5                               | 12.0 [.472]           | 13.5 [.531]             | 16.9 [.665]       | 18.7 [.736]  | 480                        | Black           |
| 87511A          | 7x3x1.5      | 19/0.32                | 1.5                               | 16.2 [.638]           | 17.9 [.705]             | 21.3 [.839]       | 23.5 [.925]  | 815                        | Black           |
| 87512A          | 12x3x1.5     | 19/0.32                | 1.5                               | 22.2 [.874]           | 24.0 [.945]             | 28.1 [1.106]      | 31.1 [1.224] | 1357                       | Black           |

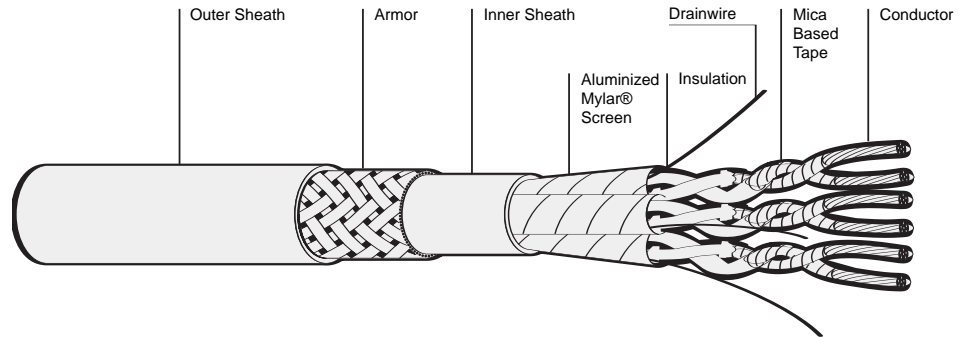
\*Cables have an overall aluminumized Mylar® shield with drainwire and an overall galvanized steel wire braid armor.

|                     |   |
|---------------------|---|
| Conductors          | Tin plated copper to BS6360   |
| Insulation          | Mica based tape, halogen-free, low smoke material complying with Raychem specification WSD695   |
| Core Identification | Pairs – black and white and numbered. Triples – black, red and white and numbered   |
| Shielding           | Aluminumized Mylar® tapewrap in contact with tinned copper drainwire  |
| Inner Sheath        | Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WCD696   |
| Armor               | Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442)   |
| Outer Sheath        | Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D. Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 +/- 50°C [122°F]z, 3 hours) Sheath printed with number and size of conductors, IEC331, Raychem, voltage rating and EPD number<br>Sheath color black<br>Oxygen index >30% (BS2782), Temperature index > 260°C [482°F] (BS2782), Smoke index <13 (BS6883)<br>Toxicity Index <2 (NES713) |
| Temperature Rating  | 90°C maximum conductor operating temperature  |
| Voltage Rating      | 600/1000V   |

MYLAR is a trademark of Dupont Teijin Films U.S.

FR-1000 (Continued)

Halogen-Free, Fire Resistant Cable Range



FR-1000 Multipair Control Cables, Collectively Shielded and Armored 600/1000V\*

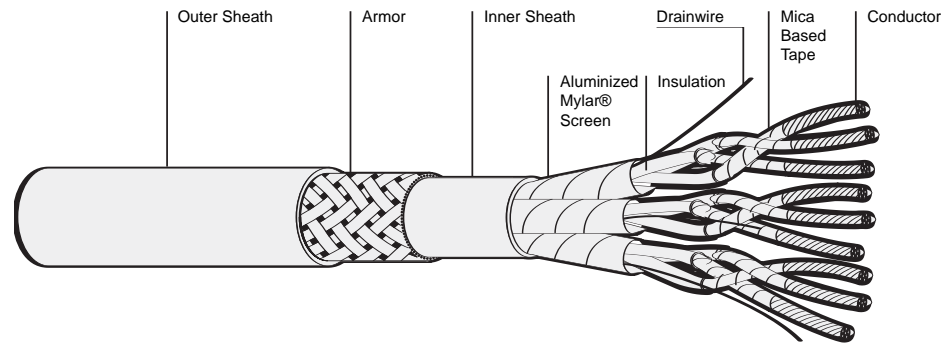
Selection Table

| Part No.<br>EPD | Construction | Conductor<br>Stranding | CSA<br>Nominal<br>mm <sup>2</sup> | Diameter<br>(Nominal) |                         | Cable             |              |                            |                 |
|-----------------|--------------|------------------------|-----------------------------------|-----------------------|-------------------------|-------------------|--------------|----------------------------|-----------------|
|                 |              |                        |                                   | Over<br>Shield        | Over<br>Inner<br>Sheath | Outer<br>Diameter |              | Nominal<br>Weight<br>kg/km | Jacket<br>Color |
|                 |              |                        |                                   |                       |                         | (min.)            | (max.)       |                            |                 |
| 93491A          | 3x2x0.75     | 19/0.23                | 0.75                              | 9.7 [.382]            | 11.1 [.437]             | 14.6 [.575]       | 16.2 [.638]  | 319                        | Grey            |
| 93492A          | 7x2x0.75     | 19/0.23                | 0.75                              | 13.1 [.516]           | 14.6 [.575]             | 18.1 [.713]       | 20.1 [.791]  | 484                        | Grey            |
| 93493A          | 12x2x0.75    | 19/0.23                | 0.75                              | 16.4 [.646]           | 18.1 [.713]             | 21.5 [.846]       | 23.7 [.933]  | 685                        | Grey            |
| 93494A          | 20x2x0.75    | 19/0.23                | 0.75                              | 21.2 [.835]           | 23.0 [.906]             | 26.8 [1.055]      | 29.6 [1.165] | 1090                       | Grey            |
| 87500A          | 2x1.5        | 19/0.32                | 1.5                               | 5.4 [.213]            | 6.7 [.264]              | 10.7 [.421]       | 11.3 [.445]  | 192                        | Black           |
| 87501A          | 2x2x1.5      | 19/0.32                | 1.5                               | 7.2 [.283]            | 8.6 [.339]              | 12.3 [.484]       | 13.5 [.531]  | 267                        | Black           |
| 87502A          | 3x2x1.5      | 19/0.32                | 1.5                               | 11.2 [.441]           | 12.7 [.500]             | 16.1 [.634]       | 17.9 [.705]  | 404                        | Black           |
| 87503A          | 5x2x1.5      | 19/0.32                | 1.5                               | 13.8 [.543]           | 15.3 [.602]             | 18.8 [.740]       | 20.8 [.819]  | 541                        | Black           |
| 87504A          | 7x2x1.5      | 19/0.32                | 1.5                               | 15.2 [.598]           | 16.9 [.665]             | 20.3 [.799]       | 22.5 [.886]  | 649                        | Black           |
| 87505A          | 10x2x1.5     | 19/0.32                | 1.5                               | 17.5 [.689]           | 19.2 [.756]             | 22.5 [.886]       | 24.9 [.980]  | 817                        | Black           |
| 87506A          | 12x2x1.5     | 19/0.32                | 1.5                               | 19.0 [.748]           | 20.7 [.815]             | 25.2 [.992]       | 26.6 [1.047] | 999                        | Black           |
| 87507A          | 20x2x1.5     | 19/0.32                | 1.5                               | 24.7 [.972]           | 26.5 [1.043]            | 30.5 [1.201]      | 33.7 [1.327] | 1541                       | Black           |
| 87508A          | 24x2x1.5     | 19/0.32                | 1.5                               | 26.6 [1.047]          | 28.6 [1.126]            | 33.6 [1.323]      | 35.6 [1.402] | 1762                       | Black           |

\*Cables have an overall aluminized Mylar® shield with drainwire and an overall galvanized steel wire braid armor.

MYLAR is a trademark of Dupont Teijin Films U.S.

FR-1000 (Continued)



FR-1000 Multitriples Control Cables,  
Individually Shielded, Armored,  
600/1000V\*

Selection Table

| Part No.<br>EPD | Construction | Conductor<br>Stranding | CSA<br>Nominal<br>mm <sup>2</sup> | Diameter<br>(Nominal)<br>Over<br>Inner<br>Sheath | Cable             |              |                            |                 |
|-----------------|--------------|------------------------|-----------------------------------|--|-------------------|--------------|----------------------------|-----------------|
|                 |              |                        |                                   |  | Outer<br>Diameter |              | Nominal<br>Weight<br>kg/km | Jacket<br>Color |
|                 |              |                        |                                   |  | (min.)            | (max.)       |                            |                 |
| 93500A          | 3x3x0.75     | 19/0.23                | 0.75                              | 12.4 [.488]                                      | 15.9 [.626]       | 17.5 [.689]  | 407                        | Grey            |
| 93501A          | 7x3x0.75     | 19/0.23                | 0.75                              | 16.8 [.661]                                      | 20.2 [.795]       | 22.4 [.881]  | 682                        | Grey            |
| 93502A          | 12x3x0.75    | 19/0.23                | 0.75                              | 22.6 [.890]                                      | 26.4 [1.039]      | 29.2 [1.150] | 1111                       | Grey            |
| 93503A          | 3x1.00       | 19/0.25                | 1.0                               | 6.6 [.260]                                       | 10.6 [.417]       | 11.6 [.457]  | 198                        | Grey            |

\*Cables have pairs individually shielded with aluminumized Mylar® and drainwire and an overall galvanized steel wire braid armor.

|                     |  |
|---------------------|--|
| Conductors          | Tin plated copper to BS6360  |
| Insulation          | Mica based tape, halogen-free, low smoke material complying with Raychem specification WSD695  |
| Core Identification | Pairs – black and white and numbered. Triples – black, red and white and numbered  |
| Shielding           | Aluminumized Mylar® tapewrap in contact with tinned copper drainwire   |
| Inner Sheath        | Halogen-free, low smoke material complying with Raychem specification WCD51/1663 and WSD696  |
| Armor               | Galvanized steel wire braid in accordance with Raychem specification WSD696 and BS6883 (BS1442)  |
| Outer Sheath        | Raychem Zerohal material complying with Raychem specification WSD696 and exceeding the requirements of BS6899, Type D. Flame retardant to IEC60332-3(Cat A) and fire resistant to IEC60331 (enhanced to 950 +/- 50°C [122°F], 3 hours) Sheath printed with number and size of conductors, IEC331, Raychem, voltage rating and EPD number<br>Sheath color black<br>Oxygen index >30% (BS2782), Temperature index > 260°C [500°F] (BS2782), Smoke index <13 (BS6883)<br>Toxicity Index <2 (NES713) |
| Temperature Rating  | 90°C [194°F] maximum conductor operating temperature   |
| Voltage Rating      | 600/1000V  |

MYLAR is a trademark of Dupont Teijin Films U.S.