

- Continuous format heat-shrinkable identification tubing
- Computer printable
- Military specification material and print performance
- -55°C to 135°C operating temperature
- 3:1 shrink ratio
- CSA certified, UL recognised (VW-1 rated)

## TTMS

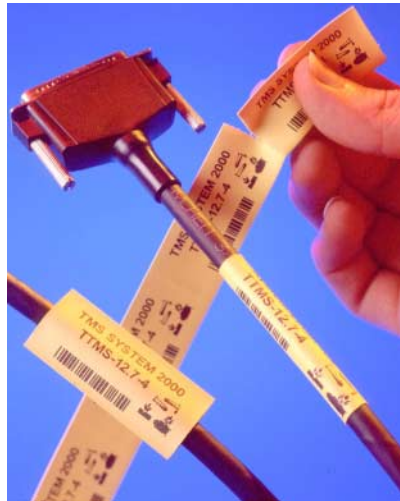
### Flat heat-shrinkable identification tubing

TTMS tubing is flattened, heat-shrinkable tubing intended for wire and cable identification. Available in continuous spools, TTMS tubing is designed for computer-based printing using Raychem's TMS 2000Plus printer. This product format makes TTMS identification tubing ideal for applications where in-sequence kitting is not of overriding importance, for example where several hundred identical markers are required. Large pack sizes, usually 100m (328 feet), minimise the number of spool

changes necessary during production runs.

TTMS identification tubing is made from durable, flame retarded, radiation-crosslinked heat-shrinkable polyolefin. The printed tubing meets the mark permanence requirements of MIL-DTL-23053/5 classes 1 and 3. The identification marks are permanent immediately after printing and remain legible even when exposed to solvents, fuels and oils. The tubing meets the mark permanence requirements of MIL-M-

81531 and MIL-STD-202 both before and after shrinking. Raychem-recommended ribbons should always be used. The tubing has a 3:1 shrink ratio (except sizes 38.1 and 50.8, which are 2:1) and cover a wide range of wire diameters, thus simplifying inventory. The tubing shrinks extremely rapidly, so installation is fast and economical. The installed markers are low profile and lightweight. They may be used to provide strain relief and insulation in addition to identification.



#### Temperature rating

|                              |                |
|------------------------------|----------------|
| Operating temperature range  | -55°C to 135°C |
| Minimum recovery temperature | 85°C           |
| Maximum storage temperature  | 40°C           |

#### Specifications and approvals

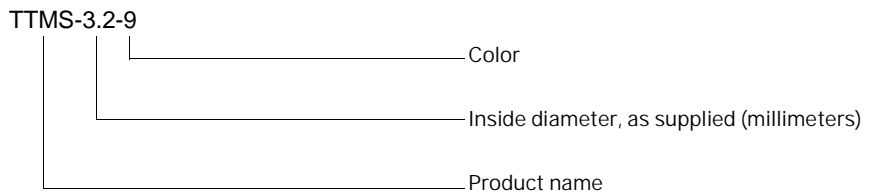
|               |  |
|---------------|--|
| Raychem       | RW 2025                                    |
| UL recognised | Standard 224, file E35586                  |
| CSA certified | CSA C22.2 No. 198.1-98, file 31929         |
| Military      | MIL-DTL-23053/5, MIL-M-81531, MIL-STD-202F |

# TTMS

## Dimensions inches (*millimeters*)

|           | Inside diameter        |                        | Recommended use range                  | Recovered wall thickness                | Weight lb/ft ( <i>g/m</i> ) |
|-----------|------------------------|------------------------|--|---|-----------------------------|
|           | Expanded (minimum)     | Recovered (maximum)    |  |   |                             |
| TTMS-2.4  | 0.093 ( <i>2.36</i> )  | 0.031 ( <i>0.79</i> )  | 0.032 - 0.075 ( <i>0.81 - 1.90</i> )   | 0.021 ± 0.003<br>( <i>0.53 ± 0.08</i> ) | 0.0017 ( <i>2.76</i> )      |
| TTMS-3.2  | 0.125 ( <i>3.18</i> )  | 0.042 ( <i>1.07</i> )  | 0.044 - 0.105 ( <i>1.11 - 2.66</i> )   | 0.023 ± 0.003<br>( <i>0.58 ± 0.08</i> ) | 0.0025 ( <i>3.73</i> )      |
| TTMS-4.8  | 0.187 ( <i>4.75</i> )  | 0.062 ( <i>1.57</i> )  | 0.069 - 0.160 ( <i>1.75 - 4.06</i> )   | 0.023 ± 0.003<br>( <i>0.58 ± 0.08</i> ) | 0.0033 ( <i>4.93</i> )      |
| TTMS-6.4  | 0.250 ( <i>6.35</i> )  | 0.083 ( <i>2.11</i> )  | 0.091 - 0.215 ( <i>2.31 - 5.46</i> )   | 0.023 ± 0.003<br>( <i>0.58 ± 0.08</i> ) | 0.0043 ( <i>6.46</i> )      |
| TTMS-9.5  | 0.375 ( <i>9.53</i> )  | 0.125 ( <i>3.18</i> )  | 0.137 - 0.320 ( <i>3.47 - 8.12</i> )   | 0.023 ± 0.003<br>( <i>0.61 ± 0.08</i> ) | 0.0062 ( <i>9.27</i> )      |
| TTMS-12.7 | 0.500 ( <i>12.70</i> ) | 0.166 ( <i>4.22</i> )  | 0.183 - 0.425 ( <i>4.64 - 10.79</i> )  | 0.024 ± 0.003<br>( <i>0.61 ± 0.08</i> ) | 0.0084 ( <i>12.53</i> )     |
| TTMS-19.0 | 0.750 ( <i>19.05</i> ) | 0.250 ( <i>6.35</i> )  | 0.275 - 0.640 ( <i>6.99 - 16.25</i> )  | 0.024 ± 0.003<br>( <i>0.61 ± 0.08</i> ) | 0.0149 ( <i>22.13</i> )     |
| TTMS-25.4 | 1.000 ( <i>25.40</i> ) | 0.333 ( <i>8.46</i> )  | 0.366 - 0.850 ( <i>9.29 - 21.59</i> )  | 0.025 ± 0.003<br>( <i>0.64 ± 0.08</i> ) | 0.0190 ( <i>28.24</i> )     |
| TTMS-38.1 | 1.500 ( <i>38.10</i> ) | 0.750 ( <i>19.05</i> ) | 0.825 - 1.300 ( <i>20.95 - 33.02</i> ) | 0.020 ± 0.003<br>( <i>0.51 ± 0.08</i> ) | 0.0340 ( <i>50.61</i> )     |
| TTMS-50.8 | 2.000 ( <i>50.80</i> ) | 1.000 ( <i>25.40</i> ) | 1.100 - 1.750 ( <i>27.94 - 44.95</i> ) | 0.025 ± 0.003<br>( <i>0.64 ± 0.08</i> ) | 0.0584 ( <i>86.96</i> )     |

## Part numbering system



## Ordering information

|           |                                 |   |        |                       |      |        |      |
|-----------|---------------------------------|---|--------|-----------------------|------|--------|------|
| Colors    | Standard                        | Yellow  | White  | Black                 |      |        |      |
|           | Code                            | 4   | 9      | 0                     |      |        |      |
|           | Non-standard                    | Red   | Orange | Green                 | Blue | Violet | Gray |
|           | Code                            | 2   | 3      | 5                     | 6    | 7      | 8    |
| Packaging | Standard                        | 328ft (100m) spools for all sizes except 38.1 and 50.8, which are 164ft (50m) |        |                       |      |        |      |
| Ribbons   | Tubing size                     | Total length  |        | Order description     |      | Color  |      |
|           | 2.4mm (3/32") to 12.7mm (1/2")  | 300m (984ft)  |        | 2000P-RIBBON-4TT-NAR  |      | Black  |      |
|           | 19.0mm (3/4") & 25.4 mm (1")    | 300m (984ft)  |        | 2000P-RIBBON-4TT-MED  |      | Black  |      |
|           | 38.1 mm (1 1/2") & 50.8mm (2")  | 300m (984ft)  |        | TMS-RJS-RIBBON-4RPSCE |      | Black  |      |
|           | 2.4mm (3/32") to 12.7mm (1/2")  | 300m (984ft)  |        | 2000P-RIBBON-4AG-NAR  |      | Silver |      |
|           | 19.0mm (3/4") & 25.4 mm (1")    | 300m (984ft)  |        | 2000P-RIBBON-4AG-MED  |      | Silver |      |
|           | 38.1 mm (1 1/2") & 50.8 mm (2") | 300m (984ft)  |        | TMS-RJS-RIBBON-4AG    |      | Silver |      |

\* Raychem-recommended ribbons should always be used.

## TTMS



TMS 2000Plus in-line thermal transfer printer

### Typical TTMS performance

refer to Raychem specification RW-2025 for details

|                             | Property                                      | Performance   | Test method   |
|-----------------------------|---|---|---|
| Physical                    | Tensile strength                              | 10.3MPa (1500psi) minimum                                       | MIL-DTL-23053, section 4.6.13                         |
|                             | Ultimate elongation                           | 200% minimum  | MIL-DTL-23053, section 4.6.13                         |
|                             | Longitudinal change                           | 0 to -20% maximum   | MIL-DTL-23053, section 4.6.4                          |
|                             | Specific gravity                              | 1.35 maximum  | ASTM D 792  |
|                             | Heat aging<br>168 hours at 175°C (347°F)      | Minimum 100% ultimate elongation<br>Print legible after 50 rubs | MIL-DTL-23053, section 4.6.9<br>See RW-2025           |
|                             | Heat shock<br>4 hours at 250°C (482°F)        | No cracking, dripping or flowing<br>Print legible               | MIL-DTL-23053, section 4.6.8<br>See RW-2025           |
|                             | Print performance                             | Print legible after 50 rubs<br>Print legible after 30 strokes   | MIL-M-81531, section 4.6.2<br>MIL-STD-202, method 215 |
| Electrical                  | Dielectric strength                           | 19.7 kV/mm (500V/mil) minimum                                   | ASTM D 2671   |
| Chemical                    | Flammability                                  | No flaming or glowing after 1 minute                            | ASTM D 2671, procedure B                              |
|                             |   | 25% maximum flag burn   | ASTM D 2671, procedure C                              |
|                             |   | No burning of cotton; no dripping                               | ASTM D 2671, procedure C                              |
|                             | Fungus resistance                             | Rating 1 maximum  | ASTM G 21   |
|                             |   | Original tensile properties retained                            | ISO 846 B   |
|                             | Corrosive effect<br>16 hours at 175°C (347°F) | Non-corrosive (copper contact)                                  | MIL-DTL-23053, section 4.6.10.1                       |
|                             |   | No pitting or blackening (copper mirror)                        | MIL-DTL-23053, section 4.6.10.2                       |
|                             | Fluid resistance<br>24 hours at 24°C (75°F)   | Print legible after 20 rubs                                     | MIL-M-81531, section 4.6.2                            |
|                             |   | Dielectric strength 15.8kV/mm min                               | ASTM D 2671   |
|                             |   | Tensile strength 6.9Mpa min                                     | MIL-DTL-23053, section 4.6.13                         |
| JP-8                        |   | MIL-T-5624  |   |
| Aviation Gasoline (100/130) |   |   |   |
| Hydraulic fluid             |   | MIL-H-5606  |   |
| Skydrol 500                 |   |   |   |
| Lubricating Oil             |   | MIL-L-7808  |   |
| Lubricating Oil             | MIL-L-23699                                   |   |   |
| 5% salt water               |   |   |   |
| Anti-icing fluid            | MIL-A-8243                                    |   |   |

\* Skydrol is a trademark of Monsanto Company.

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