

- 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

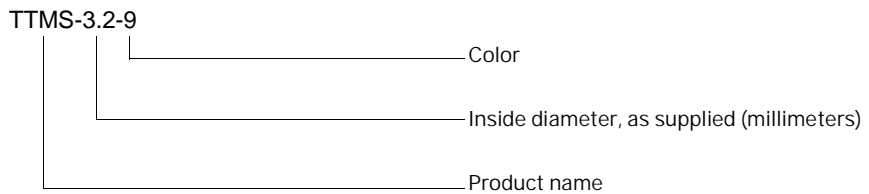
Raychem	RW 2025
UL recognised	Standard 224, file E35586
CSA certified	CSA C22.2 No. 198.1-98, file 31929
Military	MIL-DTL-23053/5, MIL-M-81531, MIL-STD-202F

# 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 ( <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 ( <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 ( <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 ( <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 ( <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 ( <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 ( <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 ( <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 ( <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 ( <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 168 hours at 175°C (347°F)	Minimum 100% ultimate elongation Print legible after 50 rubs	MIL-DTL-23053, section 4.6.9 See RW-2025
	Heat shock 4 hours at 250°C (482°F)	No cracking, dripping or flowing Print legible	MIL-DTL-23053, section 4.6.8 See RW-2025
	Print performance	Print legible after 50 rubs Print legible after 30 strokes	MIL-M-81531, section 4.6.2 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 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 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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