

**Electronics** 

## NT-MIL

## Raychem

# Flexible, rugged, modified elastomeric heat-shrinkable tubing

NT-MIL modified elastomeric heatshrinkable tubing offers outstanding resistance to abrasion and physical abuse while providing flexibility and strain relief needed in many harnessing applications. NT-MIL tubing is widely used for insulation, strain relief and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries. It meets the stringent requirements of AMS-DTL-23053/1, Classes 1 and 2. NT-MIL tubing remains flexible at temperatures as low as -70°C without cracking. It also withstands heat shock at 200°C without dripping, flowing or cracking.

NT-MIL tubing is resistant to common fluids and solvents including aviation and ground vehicle fuels, lubricating oil, and hydraulic fluids. It retains excellent physical and electrical properties following exposure.

No special skills are required to install NT-MIL tubing. Using standard heating tools, one operator can complete an installation in minutes, substantially reducing labor costs.

NT-MIL tubing is supplied in a wide range of sizes. Because NT-MIL is heat-shrinkable, each size can accommodate a variety of harness sizes, minimizing inventory and related costs.

VA/all Alatalyses

### Temperature rating

Full recovery temperature:	135°C
Continuous operating temperature:	-70°C to 121°C

### Specifications\*

Туре	Raychem	Military
NT-MIL	RW-3030	AMS-DTL-23053/1, Cl. 1 and 2

<sup>\*</sup>When ordering, always specify latest issue.

#### Dimensions (millimeters/inches)



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	Inside diameter				Wall thickness			Inside diameter					Wall thickness	
	D (min.) Expanded		d (max.) Recovered		W Recovered			D (min.) Expanded		d (max.) Recovered		W		
												Recovered		
Size	as su	pplied	after l	heating	after heating	g**	Size	as supplied		after heating		after heating**		
1/8	3.2	0.125	1.6	0.062	0.66 ± 0.20	0.026 ± 0.008	1	25.4	1.000	14.5	0.570	1.77 ± 0.51	0.070 ± 0.020	
3/16	4.8	0.187	2.4	0.093	0.84 ± 0.25	0.033 ± 0.010	1 1/4	31.8	1.250	18.1	0.714	2.20 ± 0.51	0.087 ± 0.020	
1/4	6.4	0.250	3.6	0.143	$0.89 \pm 0.25$	0.035 ± 0.010	1 1/2	38.1	1.500	21.8	0.857	2.41 ± 0.51	0.095 ± 0.020	
3/8	9.5	0.375	5.4	0.211	1.01 ± 0.25	0.040 ± 0.010	1 3/4	44.5	1.750	25.4	1.000	2.71 ± 0.51	0.107 ± 0.020	
1/2	12.7	0.500	7.3	0.286	1.21 ± 0.38	0.048 ± 0.015	2	50.8	2.000	29.0	1.140	2.79 ± 0.51	0.110 ± 0.020	
5/8	15.9	0.625	9.1	0.357	1.32 ± 0.38	0.052 ± 0.015	3	76.2	3.000	43.4	1.710	3.17 ± 0.51	0.125 ± 0.020	
3/4	19.1	0.750	10.9	0.428	1.44 ± 0.38	0.057 ± 0.015	4	101.6	4.000	57.9	2.280	3.55 ± 0.51	0.140 ± 0.020	
7/8	22.2	0.875	12.7	0.500	1.65 ± 0.38	0.065 ± 0.015								

<sup>\*\*</sup>Wall thickness will be less if tubing recovery is restricted during shrinkage.

#### Ordering information

Colors	Black
Size selection	Always order the largest size that will shrink snugly over the component being covered.
Standard packaging	On spools
Ordering description	Specify product name, size, and color; for example, NT-MIL 1/4-0 (0=Black).

#### Specification values **Property** Unit Requirement Method of test Material **Dimensions** mm (inches) See Reverse **ASTM D 2671** Longitudinal change percent +1, -10 **ASTM D 2671** Tensile strength 1500 (10.3) minimum ASTM D 412 psi (Mpa) Ultimate elongation 225 minimum ASTM D 412 percent Tensile stress at 200% elongation psi (Mpa) 1500 (10.3) maximum AMS-DTL-23053 Restricted shrinkage No cracks AMS-DTL-23053 (30 minutes at 135°C/275°F) Followed by test for: Voltage withstand Pass AMS-DTL-23053 Low temperature flexibility No cracks (4 hours at -70°C/-94°F) Heat shock No cracks, flowing or AMS-DTL-23053 (4 hours at 200°C/392°F) dripping Heat resistance **ASTM D 2671** (168 hours at 121°C/250°F) Followed by tests for: 1200 (8.3) minimum ASTM D 412 Tensile strength psi (Mpa) Ultimate elongation 175 minimum ASTM D 412 percent Dielectric strength volts/mil (kv/mm) Sizes up to 7/8: **ASTM D 2671** 300 (11.8) minimum Sizes 1 and larger: 200 (7.8) minimum Electrical Dielectric strength volts/mil (kv/mm) Sizes up to 7/8: **ASTM D 2671** 300 (11.8) minimum Sizes 1 and larger: 200 (7.8) minimum Volume resistivity 1 x 10<sup>11</sup> minimum ASTM D 876 ohm-cm Chemical AMS-DTL-23053 Copper mirror corrosion No pitting or (16 hours at 150°C/302°F) corrosion Copper contact corrosion No pitting or blackening AMS-DTL-23053 (16 hours at 150°C/302°F) of copper Flammability Self-extinguishing in **ASTM D 2671** 15 seconds; 3 inches Procedure A maximum burn length Fungus resistance No growth ASTM G 21 Water absorption percent 1.0 maximum ASTM D 570 (24 hours at 23°C/73°F) Fluid resistance AMS-DTL-23053 (24 hours at 23°C/73°F) in: JP-8 fuel (MIL-T-83133) Hydraulic fluid (MIL-H-5606) Lubricating oil (MIL-L-7808) Lubricating oil (MIL-L 23699) Salt water (5% salt) Anti-icing fluid (MIL-A-8243) Followed by tests for:

Note: Consult RW-3030 for specific details about test procedures. Raychem is a trademark of Tyco Electronics Corporation.

Tensile strength

Ultimate elongation

Dielectric strength

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psi (Mpa)

volts/mil (kV/mm)

percent

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ASTM D 412

ASTM D 412

**ASTM D 2671** 

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1000 (6.9) minimum

250 (9.8) minimum

175 minimum

without notification to the Buyer which do not affect compliance with any applicable specification

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