

tyco

Electronics

Introducing...



Raychem ZH2 and ZH4

Highly flame-retardant, low recovery temperature,
ZEROHAL heat-shrinkable tubing

DESCRIPTION

- Black commercial-grade heat-shrinkable tubing
- ZH2 is a standard wall, flexible polyolefin tubing available in metric sizes from 0.8mm to 30mm
- ZH4 is a thin wall, very flexible polyolefin tubing available in metric sizes from 0.6mm to 10mm

APPLICATIONS

- Commercial Electronics
- Rail and Mass Transit
- Automotive
- Elevators
- Construction

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KEY FEATURES

- Environmentally friendly products which are essentially free of halogens to meet the increasingly demanding requirements of the commercial electronics market.
- Flexible polyolefin tubing products which pass the very stringent UL/CSA VW-1 flame test and are rated at 125°C [257°F].
- Both products are UL recognized and CSA certified to meet the most common requirements for use in commercial applications.
- Emit minimal amounts of toxic or acid gasses when burned to meet the fire safety requirements of a variety of markets.

TEMPERATURE RATING

- Full recovery temperature: 90°C [194°F]
- Continuous operating temperature: -30°C to 125°C [-22°F to 257°F]

STANDARDS & SPECS

- Raychem Specification RW-3036
- ZH2:
UL File E35586 VW-1, 600V, 125°C;
CSA File LR31929 VW-1, 600V, 125°C
- ZH4:
UL File E85381 VW-1, 300V, 125°C;
CSA File LR31929 VW-1, 150V, 125°C

ORDERING INFORMATION

- Color : Black only
- 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, ZH2 4.0-0 (0 = black).

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PHYSICAL

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
Dimensions	mm (<i>inches</i>)	In accordance with Tables 1 & 2	ASTM D 2671
Dimensional Recovery			
Longitudinal Change			Section 4.3.1
ZH2 - ASTM D 2671	Percent	+1, -5	ASTM D 2671
ZH4 - ASTM D 2671	Percent	+1, -15	ASTM D 2671
UL 224	Percent	+3, -3	UL 224
Eccentricity (Recovered)	Percent	30 maximum	ASTM D 2671
Tensile Strength	MPa (<i>psi</i>)	10.3 (<i>1500</i>) minimum	Section 4.3.2
Ultimate Elongation	Percent	200 minimum	ASTM D 2671
Secant Modulus (expanded), 2%	MPa (<i>psi</i>)	172 (<i>2.5 x 10⁴</i>) maximum	ASTM D 2671
Low Temperature Flexibility 1 hour at -30°C (-22°F)	--	No cracking	UL 224
Heat Shock 4 hours at 250°C (482°F)	--	No cracking	UL 224
Heat Aging 7 days at 158°C (316°F) Followed by tests for:	--	--	UL 224
Tensile Strength	MPa (<i>psi</i>)	70% minimum of unaged specimens	Section 4.3.2 UL 224
Ultimate Elongation	Percent	100 minimum	
Dielectric Withstand at 2500V	Seconds	60 minimum	
Dielectric Breakdown	Volts	50% minimum of unaged specimen	Section 4.3.5 ASTM D 2671
Dielectric Strength	kV/mm (<i>Volts/mil</i>)	19.7 (<i>500</i>) minimum	
Copper Stability 7 days at 158°C (316°F) Followed by test for Ultimate Elongation		No brittleness, glazing, cracking or severe discoloration of tubing. No pitting or blackening of copper.	Section 4.3.4 ASTM D2671
	Percent	100 minimum	Section 4.3.2
Restricted Shrinkage	--	Pass	UL 224

ELECTRICAL

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
Dielectric Withstand at 2500V	Seconds	60 minimum	UL 224
Dielectric Strength	kV/mm (<i>Volts/mil</i>)	19.7 (<i>500</i>) minimum	ASTM D 2671
Volume Resistivity	Ohm-cm	10 ¹⁴ minimum	ASTM D 2671

CHEMICAL

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
Corrosive Effect 7 days at 158°C (316°F)	--	No Corrosion	ASTM D 2671
Halogen Content	Percent (ppm)	0.1 (<i>1000</i>) maximum	RW-3036 Section 4.3.7
Flammability	--	Pass	UL 224, VW-1
Water Absorption (Recovered) 24 days at 23°C (73°F)	Percent	0.5 maximum	ASTM D 2671
Fungus Resistance			ISO 846, Method B
Followed by tests for:			
Tensile Strength	MPa (<i>psi</i>)	10.3 (<i>1500</i>) minimum	ASTM D 2671
Ultimate Elongation	percent	200 minimum	ASTM D 2671
Dielectric Strength	kV/mm (<i>Volts/mil</i>)	19.7 (<i>500</i>) minimum	ASTM D 2671

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PRODUCT DIMENSIONS

Table 1 — ZH2 Tubing Dimensions, Metric [Inches]

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
0.8	1.2 ± 0.2 [0.047 ± 0.008]	0.40 [0.016]	0.20 [0.008]	0.33 [0.013]
1.0	1.5 ± 0.2 [0.059 ± 0.008]	0.50 [0.020]	0.20 [0.008]	0.33 [0.013]
1.5	2.1 ± 0.2 [0.075 ± 0.008]	0.75 [0.030]	0.20 [0.008]	0.34 [0.013]
2.0	2.6 ± 0.2 [0.102 ± 0.008]	1.00 [0.039]	0.25 [0.010]	0.43 [0.017]
2.5	3.1 ± 0.2 [0.122 ± 0.008]	1.25 [0.049]	0.25 [0.010]	0.43 [0.017]
3.0	3.6 ± 0.2 [0.142 ± 0.008]	1.50 [0.059]	0.25 [0.010]	0.43 [0.017]
3.5	4.1 ± 0.3 [0.161 ± 0.012]	1.75 [0.069]	0.25 [0.010]	0.43 [0.017]
4.0	4.6 ± 0.3 [0.181 ± 0.012]	2.00 [0.079]	0.25 [0.010]	0.43 [0.017]
5.0	5.6 ± 0.3 [0.221 ± 0.012]	2.50 [0.098]	0.30 [0.012]	0.56 [0.022]
6.0	6.6 ± 0.3 [0.260 ± 0.012]	3.00 [0.118]	0.30 [0.012]	0.56 [0.022]
7.0	7.6 ± 0.3 [0.299 ± 0.012]	3.50 [0.138]	0.30 [0.012]	0.56 [0.022]
8.0	8.6 ± 0.3 [0.339 ± 0.012]	4.00 [0.158]	0.30 [0.012]	0.56 [0.022]
9.0	9.6 ± 0.3 [0.378 ± 0.012]	4.50 [0.177]	0.30 [0.012]	0.56 [0.022]
10.0	10.4 ± 0.3 [0.409 ± 0.012]	5.00 [0.197]	0.30 [0.012]	0.56 [0.022]
11.0	11.4 ± 0.3 [0.449 ± 0.012]	5.50 [0.217]	0.30 [0.012]	0.56 [0.022]
12.0	12.7 ± 0.3 [0.500 ± 0.012]	6.00 [0.236]	0.30 [0.012]	0.56 [0.022]
13.0	13.5 ± 0.3 [0.532 ± 0.012]	6.50 [0.256]	0.35 [0.014]	0.66 [0.026]
14.0	14.4 ± 0.4 [0.567 ± 0.016]	7.00 [0.276]	0.35 [0.014]	0.68 [0.027]
15.0	15.7 ± 0.4 [0.618 ± 0.016]	7.50 [0.295]	0.35 [0.014]	0.68 [0.027]
16.0	16.9 ± 0.4 [0.665 ± 0.016]	8.00 [0.315]	0.35 [0.014]	0.68 [0.027]
18.0	19.0 ± 0.4 [0.748 ± 0.016]	9.00 [0.354]	0.40 [0.016]	0.76 [0.030]
20.0	21.4 ± 0.4 [0.843 ± 0.016]	10.00 [0.394]	0.40 [0.016]	0.76 [0.030]
22.0	23.2 ± 0.4 [0.913 ± 0.016]	11.00 [0.433]	0.45 [0.018]	0.89 [0.035]
25.0	26.8 ± 0.4 [1.055 ± 0.016]	12.50 [0.452]	0.45 [0.018]	0.89 [0.035]
27.0	28.2 ± 0.5 [1.110 ± 0.020]	12.50 [0.452]	0.45 [0.018]	0.89 [0.035]
28.0	30.0 ± 0.5 [1.181 ± 0.020]	14.00 [0.551]	0.45 [0.018]	0.89 [0.035]
30.0	32.1 ± 0.5 [1.264 ± 0.020]	15.00 [0.591]	0.45 [0.018]	0.89 [0.035]

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

Table 2 — ZH4 Tubing Dimensions, Metric [Inches]

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
0.6	0.95 ± 0.25 [0.037 ± 0.010]	0.30 [0.012]	0.10 [0.004]	0.25 [0.010]
0.8	1.20 ± 0.25 [0.047 ± 0.010]	0.40 [0.016]	0.10 [0.004]	0.25 [0.010]
1.0	1.40 ± 0.25 [0.055 ± 0.010]	0.50 [0.020]	0.10 [0.004]	0.25 [0.010]
1.5	1.90 ± 0.25 [0.075 ± 0.010]	0.75 [0.030]	0.10 [0.004]	0.25 [0.010]
2.0	2.30 ± 0.25 [0.091 ± 0.010]	1.00 [0.039]	0.10 [0.004]	0.25 [0.010]
2.5	2.80 ± 0.25 [0.110 ± 0.010]	1.25 [0.049]	0.15 [0.006]	0.25 [0.010]
3.0	3.30 ± 0.25 [0.130 ± 0.010]	1.50 [0.059]	0.15 [0.006]	0.25 [0.010]
3.5	3.80 ± 0.25 [0.150 ± 0.010]	1.75 [0.069]	0.15 [0.006]	0.25 [0.010]
4.0	4.40 ± 0.25 [0.173 ± 0.010]	2.00 [0.079]	0.15 [0.006]	0.25 [0.010]
5.0	5.50 ± 0.25 [0.217 ± 0.010]	2.50 [0.098]	0.15 [0.006]	0.25 [0.010]
6.0	6.50 ± 0.40 [0.256 ± 0.016]	3.00 [0.118]	0.15 [0.006]	0.28 [0.011]
7.0	7.50 ± 0.40 [0.295 ± 0.016]	3.50 [0.138]	0.15 [0.006]	0.28 [0.011]
8.0	8.50 ± 0.40 [0.335 ± 0.016]	4.00 [0.158]	0.15 [0.006]	0.28 [0.011]
9.0	9.50 ± 0.40 [0.374 ± 0.016]	4.50 [0.177]	0.15 [0.006]	0.28 [0.011]
10.0	10.50 ± 0.50 [0.413 ± 0.020]	5.00 [0.197]	0.15 [0.006]	0.28 [0.011]

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

FOR MORE INFORMATION

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