

SWFR X2

Highly flame-retardant, zero halogen, low recovery temperature, metric-sized heat-shrinkable tubing

SWFR X2 heat-shrinkable tubing is a cost-effective, environmentally friendly choice for many commercial applications. X2 tubing is made from a specially formulated, crosslinked polyolefin with low recovery temperature, excellent flexibility, and high flame-retardance (VW-1).

Unlike other typical flame-retardant tubings, X2 tubing is halogen free.

Compared to noncrosslinked materials, X2 tubing has a higher temperature rating and exhibits better thermal stability and resistance to physical abuse.

X2 tubing performs a variety of functions in commercial applications:

- Electrically insulates and protects in-line components, disconnect terminals, and splices.
- Bundles wires for very flexible light-duty harnesses.

- Strain-relieves electrical wire connections for long-term reliability.

X2 tubing offers a faster, easier, more reliable replacement for molding in place, dip coating, and tape wrapping.

X2 is UL-recognized and CSA-certified at 125°C, 600 V, with UL VW-1 and CSA OFT flame-retardancy ratings.

Temperature rating

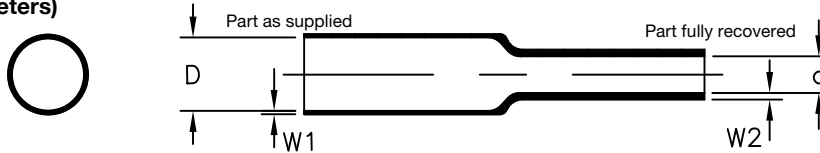
Minimum shrink temperature:	70°C
Full recovery temperature:	90°C
Continuous operating temperature:	-30°C to 125°C

Specifications*

Type	Raychem	UL	CSA
SWFR X2	SWFR X2	E35586	LR31929

* When ordering, always specify latest issue.

Dimensions (millimeters)



Size	As supplied		Fully recovered		Size	As supplied		Fully recovered	
	D Inside diameter	W1 Wall thickness (nominal)	d (max.) Inside diameter	W2 (min.) Wall thickness**		D Inside diameter	W1 Wall thickness (nominal)	d (max.) Inside diameter	W2 (min.) Wall thickness**
1.0	1.5 ± 0.2	0.2	0.5	0.44	8.0	8.6 ± 0.3	0.3	4.0	0.56
1.5	2.1 ± 0.2	0.2	0.75	0.44	9.0	9.6 ± 0.3	0.3	4.5	0.56
2.0	2.6 ± 0.2	0.25	1.0	0.44	10.0	10.4 ± 0.3	0.3	5.0	0.56
2.5	3.1 ± 0.2	0.25	1.25	0.44	11.0	11.4 ± 0.3	0.3	5.5	0.56
3.0	3.6 ± 0.2	0.25	1.5	0.44	12.0	12.7 ± 0.3	0.3	6.0	0.56
3.5	4.1 ± 0.3	0.25	1.75	0.46	16.0	16.9 ± 0.4	0.35	8.0	0.69
4.0	4.6 ± 0.3	0.25	2.0	0.46	18.0	19.0 ± 0.4	0.4	9.0	0.77
5.0	5.6 ± 0.3	0.3	2.5	0.56	20.0	21.5 ± 0.5	0.4	10.0	0.77
6.0	6.6 ± 0.3	0.3	3.0	0.56	25.0	27.0 ± 0.6	0.45	12.5	0.77
7.0	7.6 ± 0.3	0.3	3.5	0.56	30.0	32.4 ± 0.8	0.45	15.0	0.89

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

Ordering information

Color	Standard Black
Size selection	Always order the largest size that will shrink snugly over the component being covered.
Standard packaging	On spools
Marking	Marked (standard types). UL, CSA, and Japan -F- Mark on labels.
Ordering description	Specify product name and size; for example, X2 2.0

Specification values

	Property	Unit	Requirement	Method of test
Physical	Dimensions	mm	See reverse	ASTM D 2671
	Longitudinal change			
	ASTM D 2671	percent	+1, -5	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 (1500) minimum	ASTM D 2671
	Ultimate elongation	percent	200 minimum	ASTM D 2671
	Secant modulus (as supplied)	MPa (<i>psi</i>)	172 (2.5 x 10 ⁴) 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)			UL 224
	Followed by tests for:			
	Tensile strength	MPa (<i>psi</i>)	70% minimum of unaged specimens	UL 224
	Ultimate elongation	percent	100 minimum	UL 224
	Flexibility		No cracking	UL 224
	Dielectric withstand at 2500 V	seconds	60 minimum	ASTM D 2671
	Dielectric breakdown	volts	50% minimum of unaged specimens	ASTM D 2671
Dielectric strength	kV/mm (<i>volts/mil</i>)	19.7 (500) minimum	ASTM D 2671	
Restricted shrinkage		Pass	UL 224	
Electrical	Dielectric withstand at 2500 V	seconds	60 minimum	ASTM D 2671
	Dielectric strength	kV/mm (<i>volts/mil</i>)	19.7 (500) minimum	ASTM D 2671
	Volume resistivity	ohm-cm	10 ¹⁴ minimum	ASTM D 2671
Chemical	Corrosive effect (7 days at 158°C/316°F)		No corrosion	ASTM D 2671
	Copper stability (7 days at 158°C/316°F)		No brittleness, glazing, cracking, or severe discoloration of tubing. No pitting or blackening of copper.	ASTM D 2671
	Followed by test for:			
	Ultimate elongation	percent	100 minimum	ASTM D 2671
Flammability		Pass	UL 224, VW-1	

Note: Consult UL224 for specific details about test procedures.

Users should independently evaluate the suitability of the product for their application.

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SWFR_X2_DS APL 3/2019

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