DYMO®

Technical Data Sheet
Version 2
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M-1400 Heat Shrinkable Tubing

M-1400 series are white flame retardant (3 : 1 shrink ratio) polyolefin sleeves used for wire identification. The tubing meets the performance requirements of MIL-DTL-23053/5 classes 1 & 3. The identification marks are permanent immediately after printing and remain legible even when exposed to solvents, fuels and oils. The printed tubing meets the mark permanence requirements of MIL-M81531 and MIL-STD-202 both before and after shrinking.
The sleeves are low profile and lightweight. They may be used to provide strain relief and insulation in addition to identification. They are available in 4 widths (6, 9, 12 and 19 mm).

Property	Value	Test method
1. General		
- Total thickness	Maximum 0.5 mm	Micrometer
- Shrink ratio	3:1	
2. Physical properties		
- Tensile strength	10.3 MPa (1500 psi) minimum	MIL-DTL-23053, section 4.6.13
- Ultimate elongation	200 % minimum	MIL-DTL-23053, section 4.6.13
- Heat aging 168 hours at 175°C	minimum 100% ultimate elongation	MIL-DTL-23053, section 4.6.9
- Heat shock 4 hours at 250°C	no cracking, dripping or flowing	MIL-DTL-23053, section 4.6.8
3. Electrical properties		
- Dielectric strength	19.7 kV/mm (500V/mil) minimum	ASTM D 2671

4. Chemical properties		
- Flammability	No flaming or glowing after 1 minute	ASTM D 2671, procedure B
	No burning of cotton; no dripping	ASTM D 2671, procedure C
- Corrosive effect 16 hours at 175°C	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
5. Chemical resistance of text printed in ILP219	**Flat samples**	**Shrunk samples**
- Mil-Std-202F Method 215J 3 cycles of 3 minutes immersion in specified fluids, followed by 10 rubs with a toothbrush after each immersion		
Skydrol*	Little smearing but print easily legible.	Smearing but print easily legible.
Isopropylalcohol	No smearing. Print easily legible.	No smearing. Print easily legible.
Diesel	Little smearing but print easily legible.	No smearing. Print easily legible.
Water	No smearing. Print easily legible	Little smearing but print easily legible.
Eurosuper	Smearing but print easily legible	Little smearing but print easily legible.
Ethanol	Little smearing but print easily legible.	Little smearing but print easily legible.
Ethylacetate	Smearing but print easily legible	Little smearing but print easily legible
Sabesto oil**	Smearing but print easily legible	Little smearing but print easily legible

- Mil-M81531 24 hours immersion in specific fluids, followed by 20 rubs with a pencil erasure	**Flat samples**	**Shrunk samples**
Skydrol*	Little smearing but print easily legible	Severe smearing but print legible
Isopropylalcohol	No smearing. Print easily legible	Little smearing but print easily legible.
Diesel	Little smearing but print easily legible	Severe smearing but print legible.
Water	No smearing. Print easily legible	Little smearing but print easily legible.
Eurosuper	Severe smearing but print legible	Little smearing but print easily legible.
Ethanol	No smearing. Print easily legible.	No smearing. Print easily legible.
Ethylacetate	Smearing but print legible	No smearing. Print still legible.
Sabesto oil**	Severe smearing but print legible	Little smearing but print easily legible.
6. UV light stability - UV filter 30 days in Suntester (simulates 1 year outdoor exposure)	**Flat samples** Moderate discoloration of the tube (yellowing). No visible effect on text.	**Shrunk samples** Moderate discoloration of the tube (yellowing). No visible effect on text.
7. UV light stability - glass filter 30 days in Suntester (simulates 1 year exposure behind window glass)	**Flat samples** Moderate discoloration of the tube (yellowing). No visible effect on text.	**Shrunk samples** Moderate discoloration of the tube (yellowing). No visible effect on text.

8. Temperature stability		
- Operating temperature range	-55°C to 135°C	
- Minimum recovery temperature	85°C	
- Maximum storage temperature	40°C	
9. Humidity resistance	**Flat samples**	**Shrunk samples**
- 30 days at 45°C, 85 % R.H	No visible effect	No visible effect
10. Shelf life of cassette	1 year when stored below 25°C in its original packaging	

* : Skydrol is a registered trademark from Solutia
** : Sabesto is a registered trademark from Würth