Technical Data Sheet

BRADY B-345 HIGH TEMPERATURE PERMASLEEVE(TM) MARKER

TDS No. B-345
Effective Date: 10/27/2017

Description:

GENERAL
Print Technology: Thermal Transfer
Material Type: Irradiated polyvinylidene fluoride heat shrink tubing (2:1 shrink ratio)

APPLICATIONS:
B-345 PermaSleeve® Markers are designed for wire identification and insulation purposes. These sleeves are suitable for many high temperature and/or low outgassing applications. The sleeves can also be used in applications that require greater resistance to harsh chemicals such as fuels, lubricants and high power cleaning solvents.

RECOMMENDED RIBBONS
Brady R6000 Series and Brady R6600 Series black ribbons
Brady Series R4400W and Brady Series R6800 white for printing on dark colored markers

SPECIAL FEATURES
B-345 PermaSleeve® Markers meet the performance requirements of SAE AS23053/18 (Class 2) for Insulation Sleeving, SAE-AS-81531 Marking of Electrical Insulating Materials and MIL-STD-202G, Method 215K Resistance to Solvents when printed with the recommended ribbons.

The operating temperature range is -55°C (-67°F) to +225°C (437°F).

B-345 PermaSleeve® meets the requirements of NASA Vacuum Outgassing specification SP-R-0022A.

B-345 PermaSleeve® markers are supplied in roll form in a flattened format on a carrier designed for use with thermal transfer printers.

B-345 can also be printed using laser marking method. Laser marking has very good environmental, abrasion, and chemical resistance.

B-345 PermaSleeve® is available in white, black, yellow, blue and pink.

Details:

MARKER SIZE		RANGE OF WIRE DIAMETERS (in)	RANGE OF WIRE DIAMETERS (mm)	WEIGHT (g/sleeve)
3/32”	2HT-094	0.031-0.080	0.6-2.0	0.1550
1/8”	2HT-125	0.063-0.110	1.2-2.8	0.1997
3/16”	2HT-187	0.094-0.150	1.6-3.8	0.2384
¼”	2HT-250	0.125-0.215	2.4-5.5	0.3732
3/8”	2HT-375	0.187-0.320	3.2-8.1	0.5485
½”	2HT-500	0.250-0.450	4.8-11.4	0.7243
¾”	2HT-750	0.375-0.700	6.6-17.8	1.0640
1”	2HT-1000	0.450-0.950	11.4-24.1	1.4128
1 ½”	2HT-1500	0.500-1.450	12.7-36.8	3.0818

PHYSICAL PROPERTIES	TEST METHODS	AVERAGE RESULTS
Vacuum Outgassing Tested at an outside laboratory	NASA SP-R-0022A Specification Limits %Total Mass Loss (TML) – 1.0% maximum %Collected Volatile Condensable % Material (CVCM) – 0.10 maximum %Water Vapor Recovered (WVR)-Report	Black: %TML- 0.25 %CVCM - 0.02 %WVR - 0.03 White: %TML - 0.13 %CVCM - 0.00 %WVR - 0.05 Yellow: %TML - 0.14 %CVCM - 0.02 %WVR - 0.04 Pink: %TML - 0.14 %CVCM - 0.02 %WVR - 0.05 Blue: %TML - 0.14 %CVCM - 0.1 %WVR - 0.04 All colors meet the requirements of NASA SP-R-022A
Surface Flammability of Materials Using a Radiant Heat Energy Source Tested at an outside laboratory White and black tubing tested	ASTM E162 Common Maximum – 35	Flame Spread Index (Is) (rounded average result of 4 tests) White – 0 Black – 0
Specific Optical Density of Smoke (Ds) Tested at an outside laboratory White and black tubing tested	ASTM E662 Common Maximum Flaming and Nonflaming Mode at 1.5 minutes – 100 Flaming and Nonflaming Mode at 4.0 minutes – 200	Specific Optical Density (Ds) (average of 3 tests) *White:* Flaming mode at 1.5 minutes – 2 Flaming Mode at 4 minutes – 6 Nonflaming mode at 1.5 minutes – 1 Nonflaming mode at 4.0 minutes - 5 *Black:* Flaming mode at 1.5 minutes – 6 Flaming Mode at 4 minutes – 18 Nonflaming mode at 1.5 minutes – 3 Nonflaming mode at 4.0 minutes - 8

B-345 Permasleeve® white, yellow, blue and pink samples were printed on the Brady PR Plus (300 dpi) and IP™ (300 dpi) printers with the R6000 and R6600 Series black ribbon. B-345 black samples were printed with the R4400W and R6800 Series white thermal transfer ribbons on the same printers. B-345 white samples were also laser marked with a 10 watt fiber laser. The results were the same with all processes and ribbons unless otherwise stated.

PERFORMANCE PROPERTY	TEST METHODS	AVERAGE RESULTS
High Service Temperature	5 minutes at 500°F (260°C)	Yellow: no visible effect to tubing or printing Pink and Blue: very slight discoloration of tubing, no visible effect to printing White: slight discoloration of tubing, no visible effect to printing or laser marking. Black: No visible effect to tubing, slight yellowing of printing (both R4400W and R6800)
	24 hours at 350°F (180°C)	Yellow: no visible effect to tubing or printing Pink and Blue: very slight discoloration of tubing, no visible effect to printing White: very slight discoloration of tubing, no visible effect to printing or laser marking Black: no visible effect to tubing, slight yellowing of printing
	1000 hours at 267°F (130°C)	Black: No visible effect to tubing or printing White:very slight discoloration of tubing, no visible effect to printing or laser marking. Pink and Blue: very slight discoloration of

		tubing, no visible effect to printing Yellow: no visible effect to tubing or printing
Low Service Temperature	1000 hours at- 94°F (-70°C)	All colors: No visible effect to tubing or printing
Weatherability	ASTM G155 Cycle 1 1000 hours in Xenon Arc Weatherometer	Yellow, Pink and Black: No visible effect to tubing or printing Blue: Slight tube darkening, no visible effect to printing White: No visible effect to tubing or printing or laser marking.
UV Light Resistance	ASTM G155 Cycle 1 dry 1000 hours	All colors: No visible effect to tubing or printing White: no visible effect to laser marking
Humidity Resistance	1000 hours at 100°F/95% RH	All colors: No visible effect to tubing or printing White: no visible effect to laser marking
Salt Fog	1000 hours in 5% Salt Fog Chamber per ASTM B117	All colors: No visible effect to tubing or printing White: no visible effect to laser marking
Dielectric Strength	ASTM D2671 (after unrestricted shrinkage)	80 KV/mm
Flammability	ASTM D2671, Procedure A and C	Pass
Print Adherence per SAE-AS81531 (Section 3.4.2)	Samples tested after unrestricted shrinkage at 200°C for 3 minutes	Pass
Print Adherence per SAE-AS81531 (Section 3.4.2)	Samples tested after unrestricted shrinkage at 200°C for 3 minutes 20 eraser rubs with hard hand pressure	Pass
Solvent Resistance per SAE AS81531 (Sec 3.4.3) Solution A Solution C Solution D	Samples tested after unrestricted shrinkage at 200°C for 3 minutes MIL-STD-202G, Method 215K 3 cycles of 3 minute immersions in specified fluids followed by toothbrush rub after each immersion	Pass

Solution A: 1 part isopropyl alcohol, 3 parts mineral spirits
Solution B: deleted from MIL-STD-202G, Method 215K
Solution C: BIOACT® EC-7R™ terpene defluxer
Solution D: 42 parts water, 1 part propylene glycol monomethyl ether, 1 part monoethanolamine at 70°C

PERFORMANCE PROPERTY	CHEMICAL RESISTANCE

B-345 white, yellow and other colors were thermal transfer printed using the R6000 Series and R6600 Series thermal transfer ribbons and shrunk on appropriate sized wires. B-345 white samples were also laser marked with a 10 watt fiber laser. Test was conducted at room temperature after 24 hour dwell. Testing consisted of 5 cycles of 10 minute immersions in the specified chemical reagent followed by 30 minute recovery periods. Samples rubbed with a cotton swab saturated with the chemical reagent after final immersion. The rating scale below shows the effect to the quality of the print for each sample.

CHEMICAL REAGENT	SUBJECTIVE OBSERVATION OF VISUAL CHANGE			
	TUBING AND PRINTING WITHOUT SWAB RUB	PRINTING WITH SWAB RUB		
		R6000	R6600	Laser Mark
Isopropyl alcohol	No visible effect	1	1	1
Toluene	No visible effect	3	3	1
20 Wt Oil @ 70°C	No visible effect	1	1	1
MIL 5606 oil	No visible effect	1	1	1
MIL 7808 oil	No visible effect	1	1	1
Rust Veto® 377	No visible effect	1	1	1
Brake Fluid DOT 3	No visible effect	1	1	1
Northwoods™ Buzz Saw Citrus Cleaner	No visible effect	1	1	1
JP-8 Jet Fuel	No visible effect	1	1	1
Gasoline	No visible effect	1	1	1
Diesel Fuel	No visible effect	1	1	1
Skydrol® 500B-4	No visible effect	3	3	1

Super Agitene®	No visible effect	1	1	1
Propylene Glycol	No visible effect	1	1	1
Mineral Spirits	No visible effect	1	1	1
Deionized Water	No visible effect	1	1	1

Rating scale:
1=no visible effect
2=slight print fade or removal
3=moderate print fade or removal (print still legible)
4=severe print fade or removal (print illegible or just barely legible)
5=complete print fade or removal
NP=print removed prior to rub

B-345 black samples were thermal transfer printed using the R4400W Series and R6800 Series white thermal transfer ribbons and shrunk on appropriate sized wires. Test was conducted at room temperature after 24 hour dwell. Testing consisted of 5 cycles of 10 minute immersions in the specified chemical reagent followed by 30 minute recovery periods. Samples rubbed with a cotton swab saturated with the chemical reagent after final immersion. The rating scale below shows the effect to the quality of the print for each sample.

CHEMICAL REAGENT	SUBJECTIVE OBSERVATION OF VISUAL CHANGE		
	TUBING AND PRINTING WITHOUT SWAB RUB	PRINTING WITH SWAB RUB	
		R4400W	R6800
Isopropyl alcohol	No visible effect	1	1
Toluene	No visible effect	4	3
20 Wt Oil @ 70°C	No visible effect	1	1
MIL 5606 oil	No visible effect	1	1
MIL 7808 oil	No visible effect	1	1
Rust Veto® 377	No visible effect	1	1
Brake Fluid DOT 3	No visible effect	3	3
Northwoods™ Buzz Saw Citrus Cleaner	No visible effect	2	2
JP-8 Jet Fuel	No visible effect	1	1
Gasoline	No visible effect	2	2
Diesel Fuel	No visible effect	1	1
Skydrol® 500B-4	No visible effect	3	3
Super Agitene®	No visible effect	1	1
Propylene Glycol	No visible effect	1	1
Mineral Spirits	No visible effect	1	1
Deionized Water	No visible effect	1	1

Rating scale:
1=no visible effect
2=slight print fade or removal
3=moderate print fade or removal (print still legible)
4=severe print fade or removal (print illegible or just barely legible)
5=complete print fade or removal
NP=print removed prior to rub

Shelf life is five years from the date of receipt for this product as long as this product is stored in its original packaging in an environment at 32-95 degrees F (0-35 degrees C) per SAE AS23053/18. It remains the responsibility of the user to assess the risk of using this product. We encourage customers to develop testing protocols that will qualify a product's fitness for use in their actual applications.

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Note: All values shown are averages and should not be used for specification purposes.
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