

BRADY B-941 PERMASLEEVE MARKER

TDS No. B-941
Effective Date: 08/11/2005

Description:

GENERAL

Print Technology: Thermal transfer and dot matrix
Material Type: Irradiated polyolefin heat shrink tubing (3:1 shrink ratio)

APPLICATIONS

Wire identification and insulation purposes

RECOMMENDED RIBBONS

Brady R5000 Series for dot matrix printing
Brady R4300 Series for thermal transfer printing

SPECIAL FEATURES

B-941 PermaSleeve™ Markers meet the material and physical property requirements of AMS-DTL-23053/5C (class 1) for Insulation Sleeving and SAE AS-81531 for Marking of Electrical Insulating Materials when printed with R5000 Series dot matrix and R4300 Series thermal transfer ribbons.
B-941 is available in white, yellow and other colors.

REGULATORY/AGENCY APPROVALS

Based on the results of testing using recognized analytical methods performed by a third party, independent laboratory, B-941 is RoHS compliant to the current TAG MCV proposal to the EC Commission Directive 2002/95/(RoHS) for cadmium (<100 ppm), lead (<1000 ppm), hexavalent chromium (<1000 ppm), mercury (<1000 ppm), polybrominated biphenyls (PBBs <1000 ppm), and polybrominated diphenyl ethers (PBDE's <1000 ppm).

Details:

MARKER SIZE		RANGE OF WIRE DIAMETER (in)	RANGE OF WIRE DIAMETER (mm)
3/32"	3PS-094	0.023 - 0.080	0.58 - 2.03
1/8"	3PS-125	0.046 - 0.110	1.17 - 2.79
3/16"	3PS-187	0.062 - 0.150	1.57 - 3.81
1/4"	3PS-250	0.094 - 0.215	2.39 - 5.46
3/8"	3PS-375	0.125 - 0.320	3.18 - 8.13
1/2"	3PS-500	0.187 - 0.450	4.75 - 11.43
1"	PS-1000	0.450 - 0.950	11.43 - 24.13

Shrink Method: Any industrial grade heat gun may be used to shrink B-941 PermaSleeve™ Markers.

Performance properties tested on B-941 white and yellow sleeves printed with R5000 Series dot matrix and R4300 Series thermal transfer ribbons. Results are the same for both colors and ribbons unless noted. Sleeves were tested shrunk on the appropriate sized wires.

PERFORMANCE PROPERTIES	TEST METHODS	AVERAGE RESULTS
Short Term High Service Temperatures	5 minutes at various temperatures	White: Slight discoloration at 464°F (240°C). Sleeves are moderately discolored at 536°F (280°C) but are still functional. Yellow: No visible effect at 500°F (260°C). Sleeves are slightly discolored at 536°F (280°C). Print is legible on all sleeves printed with both ribbons.
Short Term High Service Temperature	24 hours at various temperatures	Both sleeves show slight discoloration at 320°F (160°C). Moderate discoloration at 356°F (180°C). Print is legible on all sleeves printed with both ribbons.

Long Term High Service Temperature	1000 hours at various temperatures	Both sleeves show slight discoloration at 248°F (120°C). Moderate discoloration is observed at 293°F (145°C). Print is legible on all sleeves printed with both ribbons.
Low Service Temperature	1000 hours at -94°F (-70°C)	No visible effect
Weatherability	ASTM G155, Cycle 1 1000 hours in Xenon Arc Weatherometer	Slight discoloration (white), slight tubing fade (yellow). Dot matrix print shows slight to moderate fade.
Humidity Resistance	1000 hours at 100°F/95% R.H.	No visible effect
Salt Fog	1000 hours at 5% Salt Spray	No visible effect
Dielectric Strength	ASTM D 2671 (after unrestricted shrink)	500 volts/mil minimum
Flammability	Fed. STD-228, Method 5221 (Tubing shrunk on metal rod)	Self-extinguishing within 60 seconds
Marking Permanence per SAE-AS81531	Samples tested after unrestricted shrink at 200°C for 3 minutes. 20 eraser rubs with hard hand pressure	Print still easily legible on sleeves printed with both ribbons.
Solvent Resistance per MIL-STD-202, Method 215K Solution A Solution C Solution D	Samples tested after unrestricted shrink at 200°C for 3 minutes. 3 cycles of 3 minute immersions in specified fluids followed by toothbrush rub after each immersion	Print still easily legible with both ribbons in all test fluids.

Solution A: 1 part isopropyl alcohol, 3 parts mineral spirits

Solution B: deleted from MIL-STD-202, 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
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B-941 white and yellow sleeves were thermal transfer printed using Brady R4300 Series and dot matrix printed using Brady R5000 Series ribbon and shrunk on appropriate sized wires. Testing was conducted at room temperature after 24 hour dwell and consisted of 5 cycles of 10 minute immersions in the specified chemical reagent followed by 30 minute recovery periods. After the final immersion, the samples were removed from the test fluid and the printed image rubbed 10 times with a cotton swab saturated with the test fluid. The rating scale below shows the effect to the quality of print for each sample. The appearance of the wiremarker was also evaluated after the final immersion.

Unless otherwise noted, there was no visible effect to the printed image prior to rubbing. Gasoline

CHEMICAL REAGENT	SUBJECTIVE OBSERVATION OF VISUAL CHANGE		
	EFFECT TO WIREMARKER	EFFECTS TO PRINTED IMAGE	
		R4300	R5000
CLEANERS & SOLVENTS			
Northwoods™ Buzz Saw Degreaser	No visible effect	1	2
Formula 409®	No visible effect	1	1
Acetone	No visible effect	2	2
Toluene	Sleeves become loose on wires due to sleeve material swelling during exposure to test fluid	3-5	4-5
Isopropyl Alcohol	No visible effect	1-2	2
Mineral Spirits	Sleeves become loose on wires due to swelling during exposure to test fluid	3-4	3
Deionized Water	No visible effect	1	1
FUELS, OILS, & LUBRICANTS			
Sleeves become loose on wires due to swelling during exposure to test fluid	4	4-5	
Brake Fluid DOT 3	No visible effect	1-3	3
30 WT Oil @ 70°C	No visible effect	3	3-4
Diesel Fuel	Sleeves become loose on wires due to swelling during exposure to test fluid	2-4	3

AEROSPACE RELATED FLUIDS			
JP-8 Jet Fuel	Sleeves become loose on wires due to swelling during exposure to test fluid	3-4	3-4
Skydrol® 500B-4	No visible effect	3	3-4
Mil 5606 Oil	Sleeves become loose on wires due to swelling during exposure to test fluid	3-4	3

Rating Scale:

1 = no visible effect

2 = slight smear or print removal, detectable but minimal smear

3 = moderate smear or print removal (print still legible)

4 = severe smear or print removal (print illegible or just barely legible)

5 = complete print removal

NP = print removed prior to rub

Product testing, customer feedback, and history of similar products, support a customer performance expectation of at least **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 *65-95 degrees F per AMS-DTL-23053/5C*. We are confident that our product will perform well beyond this time frame. However, it remains the responsibility of the user to assess the risk of using such product. We encourage customers to develop functional testing protocols that will qualify a product's fitness for use, in their actual applications.

Trademarks:

BIOACT® is a registered trademark of Petroferm, Inc.

EC-7R™ is a trademark of Petroferm Inc.

Formula 409® is a registered trademark of the Chlorox Company

Northwoods™ is a trademark of the Superior Chemical Corporation.

PermaSleeve™ is a trademark of Brady Worldwide, Inc.

Skydrol® is a registered trademark of the Monsanto Company

ASTM: American Society for Testing and Materials (U.S.A.)

SAE: Society of Automotive Engineers (U.S.A)

DOT: Department of Transportation (U.S.A)

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

Test data and test results contained in this document are for general information only and shall not be relied upon by Brady customers for designs and specifications, or be relied on as meeting specified performance criteria. Customers desiring to develop specifications or performance criteria for specific product applications should contact Brady for further information.

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