

## BRADY B-344 FLUID RESISTANT PERMASLEEVE® MARKER

TDS No. B-344

Effective Date: 01/08/2014

### Description:

#### GENERAL

**Print Technology:** Thermal Transfer

**Material Type:** Irradiated polyolefin heat shrink tubing (3:1 shrink ratio)

### APPLICATIONS:

B-344 PermaSleeve® Markers are designed for wire identification and insulation purposes. These sleeves are suitable for use in applications that require greater resistance to harsh chemicals such as fuels, lubricants and high power cleaning solvents.

### RECOMMENDED RIBBONS

Brady R6600 Series black ribbon

Brady R6700 white for printing on dark colored markers

### SPECIAL FEATURES

B-344 PermaSleeve® Markers meet the performance requirements of SAE-AMS-DTL-23053/6 (Class 1) 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 +135°C (275°F).

B-344 PermaSleeve® markers are supplied in roll form in a flattened format on a carrier designed for use with thermal transfer printers.

B-344 PermaSleeve® is available in white, yellow, black, red, orange, green, blue, violet, pink, gray, and brown.

### Details:

| MARKER SIZE | RANGE OF WIRE DIAMETERS (in) | RANGE OF WIRE DIAMETERS (mm) | WEIGHT (g/inch) |
|-------------|------------------------------|------------------------------|-----------------|
| 3/32"       | 0.031-0.080                  | 0.79-2.03                    | 0.056           |
| 1/8"        | 0.042-0.110                  | 1.07-2.8                     | 0.072           |
| 3/16"       | 0.062-0.150                  | 1.57-3.81                    | 0.115           |
| 1/4"        | 0.083-0.215                  | 2.11-5.46                    | 0.154           |
| 3/8"        | 0.125-0.320                  | 3.18-8.13                    | 0.229           |
| 1/2"        | 0.166-0.450                  | 4.21-11.43                   | 0.280           |
| 3/4"        | 0.250-0.700                  | 6.35-17.78                   | 0.389           |
| 1"          | 0.333-0.950                  | 8.46-24.13                   | 0.558           |
| 1 1/2"      | 0.750-1.450                  | 19.05-36.83                  | 1.211           |

| PHYSICAL PROPERTIES                                                                                                                      | TEST METHODS                                                                                                                        | AVERAGE RESULTS                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface Flammability of Materials Using a Radiant Heat Energy Source<br>Tested at an outside laboratory<br>White and black tubing tested | ASTM E162<br>Common Maximum – 35                                                                                                    | Flame Spread Index (Is) (rounded average result of 4 tests)<br>White – 0<br>Black – 5                                                                                      |
| Specific Optical Density of Smoke (Ds)<br>Tested at an outside laboratory<br>White and black tubing tested                               | ASTM E662<br>Common Maximum<br>Flaming and Nonflaming Mode at 1.5 minutes – 100<br>Flaming and Nonflaming Mode at 4.0 minutes – 200 | Specific Optical Density (Ds) (average of 3 tests)<br>White:<br>Flaming mode at 1.5 minutes : 181<br>Flaming Mode at 4 minutes : 187<br>Nonflaming mode at 1.5 minutes : 2 |

|  |  |                                                                                                                                                                                                     |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  | Nonflaming mode at 4.0 minutes : 19<br>Black:<br>Flaming mode at 1.5 minutes : 172<br>Flaming Mode at 4 minutes : 175<br>Nonflaming mode at 1.5 minutes : 21<br>Nonflaming mode at 4.0 minutes:: 52 |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

B-344 Permasleeve® white, yellow, and other colors were printed on the Bradyprinter™ PR+ (600 dpi) and with R6600 Series black ribbon. B-344 black samples were printed with the R6700 Series white thermal transfer ribbon on the same printers. The results were the same with all ribbons unless otherwise stated. White, yellow, and black data listed below, other color data available upon request.

| PERFORMANCE PROPERTY                                                                     | TEST METHODS                                                                                                                                        | AVERAGE RESULTS                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Service Temperature                                                                 | 5 minutes at 500°F (260°C)                                                                                                                          | White: Slight discoloration of tubing, no visible effect to printing<br>Yellow: slight discoloration of tubing, No visible effect to printing<br>Black: No visible effect                                             |
|                                                                                          | 24 hours at 350°F (180°C)                                                                                                                           | White: Slight discoloration of tubing, no visible effect to printing<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: No visible effect                                             |
|                                                                                          | 1000 hours at 267°F (130°C)                                                                                                                         | White: Slight discoloration of tubing, no visible effect to printing<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: No visible effect                                             |
| Low Service Temperature                                                                  | 1000 hours at -94°F (-70°C)                                                                                                                         | White: No visible effect<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: No visible effect                                                                                         |
| Weatherability                                                                           | ASTM G155 Cycle 1<br>1000 hours in Xenon Arc Weather-Ometer®                                                                                        | White: Slight discoloration of tubing, no visible effect to printing<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: Slight discoloration of tubing, no visible effect to printing |
| UV Light Resistance                                                                      | ASTM G155 Cycle 1 dry<br>1000 hours                                                                                                                 | White: Slight discoloration of tubing, no visible effect to printing<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: No visible effect                                             |
| Humidity Resistance                                                                      | 1000 hours at 100°F/95% RH                                                                                                                          | White: No visible effect<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: Slight discoloration of tubing, no visible effect to printing                                             |
| Salt Fog                                                                                 | 1000 hours at 5% Salt Spray                                                                                                                         | White: No visible effect<br>Yellow: Slight discoloration of tubing, no visible effect to printing<br>Black: No visible effect                                                                                         |
| Dielectric Strength                                                                      | ASTM D2671 (after unrestricted shrinkage)                                                                                                           | 78 KV/mm                                                                                                                                                                                                              |
| Flammability                                                                             | ASTM D2671, Procedure B                                                                                                                             | Pass                                                                                                                                                                                                                  |
| Print Adherence per SAE-AS81531 (Section 3.4.2)                                          | Samples tested after unrestricted shrinkage at 200°C for 3 minutes<br><br>20 eraser rubs with hard hand pressure                                    | White: No visible effect to printing<br>Yellow: No visible effect to printing<br>Black: Some print fade, print still legible                                                                                          |
| Solvent Resistance per SAE-AS81531 (Sec 3.4.3)<br>Solution A<br>Solution C<br>Solution D | Samples tested after unrestricted shrinkage at 200°C for 3 minutes<br><br>MIL-STD-202G, Method 215K<br>3 cycles of 3 minute immersions in specified | White: No visible effect to printing<br>Yellow: No visible effect to printing<br>Black: Some print fade, print still legible                                                                                          |

|  |                                                        |  |
|--|--------------------------------------------------------|--|
|  | fluids followed by toothbrush rub after each immersion |  |
|--|--------------------------------------------------------|--|

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 monomethylether, 1 part monoethanolamine at 70°C

| PERFORMANCE PROPERTY | CHEMICAL RESISTANCE |
|----------------------|---------------------|
|----------------------|---------------------|

B-344 white were thermal transfer printed using the R6600 Series thermal transfer ribbon 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 |
| Isopropyl alcohol    | 1                                                  | 1                      |
| Toluene              | 1                                                  | 1                      |
| 20 Wt Oil @ 70°C     | 1                                                  | 1                      |
| MIL 5606 oil         | Tubing stained pink, no visible effect on printing |                        |
| MIL 7808 oil         | 1                                                  | 1                      |
| Rust Veto® 377       | 1                                                  | 1                      |
| Brake Fluid DOT 3    | 1                                                  | 1                      |
| JP-8 Jet Fuel        | 1                                                  | 1                      |
| Gasoline             | 1                                                  | 1                      |
| Diesel Fuel          | 1                                                  | 1                      |
| Skydrol® 500B-4      | 1                                                  | 1                      |
| Super Agitene®       | 1                                                  | 1                      |
| Propylene Glycol     | 1                                                  | 1                      |
| Mineral Spirits      | 1                                                  | 1                      |
| Deionized Water      | 1                                                  | 1                      |
| Methyl Ethyl Ketone  | 1                                                  | 1                      |
| Formula 409          | 1                                                  | 1                      |
| Acetone              | 1                                                  | 1                      |
| Mil PRF 83282        | 1                                                  | 1                      |
| Methyl Propyl Ketone | 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

B344 black samples were thermal transfer printed using the R6700 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 |
| Isopropyl alcohol | 1                                       | 2-3                    |
| Toluene           | 1                                       | 3-4                    |
| 20 Wt Oil @ 70°C  | 1                                       | 2-4                    |
| MIL 5606 oil      | 1                                       | 2-4                    |
| MIL 7808 oil      | 1                                       | 2-4                    |
| Rust Veto® 377    | 1                                       | 2-5                    |
| Brake Fluid DOT 3 | 1                                       | 2-4                    |
| JP-8 Jet Fuel     | 1                                       | 2-4                    |

|                      |   |     |
|----------------------|---|-----|
| Gasoline             | 1 | 2-4 |
| Diesel Fuel          | 1 | 2-4 |
| Skydrol® 500B-4      | 1 | 2-4 |
| Super Agitene®       | 1 | 2-4 |
| Propylene Glycol     | 1 | 1   |
| Mineral Spirits      | 1 | 2-4 |
| Deionized Water      | 1 | 1   |
| Methyl Ethyl Ketone  | 1 | 2-4 |
| Formula 409®         | 1 | 1   |
| Acetone              | 1 | 2-3 |
| Mil PRF 83282        | 1 | 2-4 |
| Methyl Propyl Ketone | 1 | 3-4 |

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

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 to 95 degrees F (18 to 35 degrees C) per SAE-AMS-DTL 23053/6. We are confident that our products 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:

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S. I.: International System of Units

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

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

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