

## BRADY B-342 PERMASLEEVE MARKER

TDS No. B-342

Effective Date: 7/25/2024

### 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 Series R6600 for thermal transfer printing best smear and chemical resistance

Brady Series R4300 for thermal transfer printing general purpose ribbon

Brady Series R4502S for thermal transfer printing silver on dark colored markers

Brady Series R6700 for thermal transfer printing white on dark colored markers

### REGULATORY/AGENCY APPROVALS

**UL:** B-342 is a UL Recognized Component to UL224 Extruded Insulated Tubing. See UL file E333786 for specific details.

For information on the Weee-RoHS compliance status for a Brady Product go to one of the following websites:

In Canada: [www.bradycanada.ca/weee-rohs](http://www.bradycanada.ca/weee-rohs)

In Europe: [www.bradyeurope.com/rohs](http://www.bradyeurope.com/rohs)

In Japan: [www.bradyc.co.jp/products/labelsuse/rohs](http://www.bradyc.co.jp/products/labelsuse/rohs)

All other regions: [www.bradyc.com/weee-rohs](http://www.bradyc.com/weee-rohs)

### SPECIAL FEATURES

B-342 PermaSleeve™ Markers are made from heat shrinkable tubing that is qualified to SAE AS23053/5 (Class 4). See the QPL listing for Brady Corporation product part numbers PS-C-\*

B-342 PermaSleeve™ Markers meet the mark permanence requirements of AS-81531 and AS-5942 when printed with the Brady Series R6600, R4300, R4502S, R6700 series thermal transfer ribbons, R5000 Series dot matrix ribbon, and with laser marking."

The operating temperature range is -55°C (-67°F) to +135°C (+275°F).

A minimum recovery temperature of 150°C (302°F) is recommended for B-342 PermaSleeve® markers.

B-342 is available in white, yellow, black, red, orange, green, blue, violet, pink, gray, and brown.

B-342 can also be printed using laser marking method. Laser marking has very good environmental, abrasion, and chemical resistance.

### Details:

| MARKER SIZE |                     | RANGE OF WIRE DIAMETER ((in) | RANGE OF WIRE DIAMETER ((mm) |
|-------------|---------------------|------------------------------|------------------------------|
| 3/32"       | 3PS-094, 3UPS-094   | 0.023 - 0.080                | 0.58 - 2.03                  |
| 1/8"        | 3PS-125, 3UPS-125   | 0.046 - 0.110                | 1.17 - 2.79                  |
| 3/16"       | 3PS-187, 3UPS-187   | 0.062 - 0.150                | 1.57 - 3.81                  |
| 1/4"        | 3PS-250, 3UPS-250   | 0.094 - 0.215                | 2.39 - 5.46                  |
| 3/8"        | 3PS-375, 3UPS-375   | 0.125 - 0.320                | 3.18 - 8.13                  |
| 1/2"        | 3PS-500, 3UPS-500   | 0.187 - 0.450                | 4.75 - 11.43                 |
| 3/4"        | 3PS-750, 3UPS-750   | 0.250 - 0.700                | 6.35 - 17.78                 |
| 1"          | 3PS-1000, 3UPS-1000 | 0.375 - 0.950                | 9.53 - 24.13                 |
| 1 1/2"      | 3PS-1500            | 0.500 - 1.450                | 12.7 - 36.83                 |

Shrink Method: Any industrial grade heat gun may be used to shrink B-342 PermaSleeve® Markers.

| PHYSICAL PROPERTIES                                                                                                                           | TEST METHODS                                                                                                                        | AVERAGE RESULTS                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface Flammability of Materials Using a Radiant Heat Energy Source<br>Tested at an outside laboratory White, yellow and black tubing tested | ASTM E162<br>Common Maximum – 35                                                                                                    | Flame Spread Index (Is) (rounded average result of 4 tests)<br>White/yellow – 5<br>Black 0                                                                                                                                                                                                                                                                                                |
| Specific Optical Density of Smoke (Ds)<br>Tested at an outside laboratory<br>White, yellow 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/Yellow:<br>Flaming Mode at 1.5 minutes – 76<br>Flaming Mode at 4.0 minutes – 155<br>Nonflaming Mode at 1.5 minutes – 2<br>Nonflaming Mode at 4.0 minutes – 13<br>Black:<br>Flaming Mode at 1.5 minutes – 92<br>Flaming Mode at 4.0 minutes – 155<br>Nonflaming Mode at 1.5 minutes – 4<br>Nonflaming Mode at 4.0 minutes – 41 |

B-342 white, yellow and other colors tested/printed with R5000 Series dot matrix and R4300 and R6600 Series thermal transfer ribbons. B-342 black samples tested printed with R4502S silver and R6700 white thermal transfer ribbon. B-342 white samples were also laser marked with a 10 watt fiber laser. Results are the same with all processes and ribbons unless stated otherwise. White, yellow, and black data listed below, other color data available upon request.

| PERFORMANCE PROPERTIES                      | TEST METHODS                                                                                                                                                                                                                                       | AVERAGE RESULTS                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Service Temperatures                   | 5 minutes at 500°F (260°C)<br><br>24 hours at 350°F (180°C)<br><br>1000 hours at 267°F (130°C)                                                                                                                                                     | White: Slight tube darkening and yellowing<br>Yellow: Moderate tube darkening. Black: No visible effect to tubing, slight print yellowing (R6700).<br><br>White and yellow: Slight tube darkening.<br><br>White and yellow: Moderate tube darkening.<br><br>No visible change to printing in above conditions (R4300, R6600, and laser marking) |
| Low Service Temperature                     | 1000 hours at -94°F (-70°C)                                                                                                                                                                                                                        | No visible effect                                                                                                                                                                                                                                                                                                                               |
| Weatherability                              | ASTM G155 Cycle 1<br>1000 hours in Xenon Arc<br>Weatherometer                                                                                                                                                                                      | White: Slight tube yellowing Yellow: No visible effect<br>No visible change to printing                                                                                                                                                                                                                                                         |
| UV Light Resistance                         | ASTM G155 Cycle 1 dry 1000 hours                                                                                                                                                                                                                   | White: Moderate tube yellowing Yellow: No visible effect<br>No visible change to printing                                                                                                                                                                                                                                                       |
| Humidity Resistance                         | 1000 hours at 100°F/95% R.H.                                                                                                                                                                                                                       | No visible effect                                                                                                                                                                                                                                                                                                                               |
| Salt Fog                                    | 1000 hours in 5% Salt Fog Chamber per ASTM B117                                                                                                                                                                                                    | Moderate print fade (R4502S on black marker).<br>No visible effect to all other color/ribbon combinations and laser marking.                                                                                                                                                                                                                    |
| Dielectric Strength                         | ASTM D2671 (after unrestricted shrink)                                                                                                                                                                                                             | 500 volts/mil minimum                                                                                                                                                                                                                                                                                                                           |
| Flammability                                | ASTM D2671, Procedure B                                                                                                                                                                                                                            | Self-extinguishing within 60 seconds                                                                                                                                                                                                                                                                                                            |
| Print Adherence per SAE-AS81531 (Sec 3.4.2) | Samples tested after unrestricted shrink at 200°C for 3 minutes<br><br>20 eraser rubs with hard hand pressure                                                                                                                                      | Print is still easily legible on sleeves printed with all ribbons and laser marking.                                                                                                                                                                                                                                                            |
| Solvent Resistance                          | MIL-STD-202 method 215K with Change 1, 3 cycles of 3 minute immersions in specified fluids followed by toothbrush rub after each immersion<br><br>B342 white printed with R4300 and R6600, tested after unrestricted shrink at 200°C for 3 minutes | No visible effect                                                                                                                                                                                                                                                                                                                               |

B-342 white, yellow and other colors were dot matrix printed using Brady R5000 Series ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE                                     |                                    |
|--------------------------------|-----------------------------------------------------------------------------|------------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB                                        | PRINTING WITH SWAB RUB             |
| Methyl Ethyl Ketone            | No visible effect                                                           | Severe print fade, print legible   |
| Isopropyl Alcohol              | No visible effect                                                           | Severe print fade, print legible   |
| JP-8 Jet Fuel                  | No visible effect                                                           | Severe print fade, print legible   |
| Kerosene                       | No visible effect                                                           | Severe print fade, print legible   |
| Mil 5606 Oil                   | White and yellow tubing stained red on edges, no visible effect on printing | Severe print fade, print legible   |
| Mil 7808 Oil                   | No visible effect                                                           | Severe print fade, print legible   |
| Speedi Kut Cutting Oil 332     | No visible effect                                                           | Moderate print fade, print legible |
| Gasoline                       | No visible effect                                                           | Severe print fade, print legible   |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on printing                        | Severe print fade, print legible   |
| Skydrol® 500B-4                | No visible effect                                                           | Severe print fade, print legible   |
| Propylene Glycol               | No visible effect                                                           | Moderate print fade, print legible |
| Super Agitene®                 | No visible effect                                                           | Severe print fade, print legible   |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                                           | Severe print fade, print legible   |
| Deionized Water                | No visible effect                                                           | No visible effect                  |
| 3% Alconox® Detergent          | No visible effect                                                           | No visible effect                  |
| 5% Salt Water Solution         | No visible effect                                                           | No visible effect                  |

B-342 white, yellow and other colors were thermal transfer printed using the Brady Series R4300 ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE              |                                    |
|--------------------------------|------------------------------------------------------|------------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB                 | PRINTING WITH SWAB RUB             |
| Methyl Ethyl Ketone            | No visible effect                                    | Severe print fade, print legible   |
| Isopropyl Alcohol              | No visible effect                                    | Severe print fade, print legible   |
| JP-8 Jet Fuel                  | No visible effect                                    | Severe print fade, print legible   |
| Kerosene                       | No visible effect                                    | Severe print fade, print legible   |
| Mil 5606 Oil                   | Tubing stained red, no visible effect on printing    | Severe print fade, print legible   |
| Mil 7808 Oil                   | No visible effect                                    | Severe print fade, print legible   |
| Speedi Kut Cutting Oil 332     | No visible effect                                    | Moderate print fade, print legible |
| Gasoline                       | No visible effect                                    | Severe print fade, print legible   |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on printing | Severe print fade, print legible   |
| Skydrol® 500B-4                | No visible effect                                    | Severe print fade, print legible   |
| Propylene Glycol               | No visible effect                                    | Slight print fade, print legible   |
| Super Agitene®                 | No visible effect                                    | Severe print fade, print legible   |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                    | Severe print fade, print legible   |
| Deionized Water                | No visible effect                                    | No visible effect                  |
| 3% Alconox® Detergent          | No visible effect                                    | Slight print fade, print legible   |
| 5% Salt Water Solution         | No visible effect                                    | Slight print fade, print legible   |

B-342 white and yellow were thermal transfer printed using the Brady Series R6600 ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT    | SUBJECTIVE OBSERVATION OF VISUAL CHANGE |                                    |
|---------------------|-----------------------------------------|------------------------------------|
|                     | TUBING AND PRINTING WITHOUT SWAB RUB    | PRINTING WITH SWAB RUB             |
| Methyl Ethyl Ketone | No visible effect                       | Moderate print fade, print legible |
| Isopropyl Alcohol   | No visible effect                       | No visible effect                  |
| JP-8 Jet Fuel       | No visible effect                       | Moderate print fade, print legible |
| Kerosene            | No visible effect                       | Moderate print fade, print legible |

|                                |                                                            |                                       |
|--------------------------------|------------------------------------------------------------|---------------------------------------|
| Mil 5606 Oil                   | Tubing stained red on edges, no visible effect on printing | Slight print fade, print legible      |
| Mil 7808 Oil                   | No visible effect                                          | No visible effect                     |
| Speedi Kut Cutting Oil 332     | No visible effect                                          | No visible effect                     |
| Gasoline                       | No visible effect                                          | Moderate print fade, print legible    |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on printing       | Slight print fade, print legible      |
| Skydrol® 500B-4                | No visible effect                                          | Slight print fade, print legible      |
| Propylene Glycol               | No visible effect                                          | No visible effect                     |
| Super Agitene®                 | No visible effect                                          | Moderate print fade, print legible    |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                          | Severe print fade, print just legible |
| Deionized Water                | No visible effect                                          | No visible effect                     |
| 3% Alconox® Detergent          | No visible effect                                          | No visible effect                     |
| 5% Salt Water Solution         | No visible effect                                          | No visible effect                     |

B-342 black samples were thermal transfer printed using the Brady Series R4502S silver ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE |                                  |
|--------------------------------|-----------------------------------------|----------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB    | PRINTING WITH SWAB RUB           |
| Methyl Ethyl Ketone            | No visible effect                       | Severe print fade, print legible |
| Isopropyl Alcohol              | No visible effect                       | No visible effect                |
| JP-8 Jet Fuel                  | No visible effect                       | Severe print fade, print legible |
| Kerosene                       | No visible effect                       | Severe print fade, print legible |
| Mil 5606 Oil                   | No visible effect                       | Severe print fade, print legible |
| Mil 7808 Oil                   | No visible effect                       | Severe print fade, print legible |
| Speedi Kut Cutting Oil 332     | No visible effect                       | No visible effect                |
| Gasoline                       | No visible effect                       | Severe print fade, print legible |
| Rust Veto® 377                 | No visible effect                       | Severe print fade, print legible |
| Skydrol® 500B-4                | No visible effect                       | Severe print fade, print legible |
| Propylene Glycol               | No visible effect                       | Moderate print fade              |
| Super Agitene®                 | No visible effect                       | Severe print fade, print legible |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                       | Severe print fade, print legible |
| Deionized Water                | No visible effect                       | No visible effect                |
| 3% Alconox® Detergent          | No visible effect                       | Slight print fade                |
| 5% Salt Water Solution         | No visible effect                       | Slight print fade                |

B-342 black samples were thermal transfer printed using the Brady Series R6700 white ribbon and shrunk on appropriate size wires. Test 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 after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE |                                  |
|--------------------------------|-----------------------------------------|----------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB    | PRINTING WITH SWAB RUB           |
| Methyl Ethyl Ketone            | No visible effect                       | Severe print fade, print legible |
| Isopropyl Alcohol              | No visible effect                       | Severe print fade, print legible |
| JP-8 Jet Fuel                  | No visible effect                       | Severe print fade, print legible |
| Kerosene                       | No visible effect                       | Severe print fade, print legible |
| Mil 5606 Oil                   | No visible effect                       | Complete print removal           |
| Mil 7808 Oil                   | No visible effect                       | Severe print fade, print legible |
| Speedi Kut Cutting Oil 332     | No visible effect                       | Moderate print fade              |
| Gasoline                       | No visible effect                       | Severe print fade, print legible |
| Rust Veto® 377                 | No visible effect                       | Severe print fade, print legible |
| Skydrol® 500B-4                | No visible effect                       | Severe print fade, print legible |
| Propylene Glycol               | No visible effect                       | Moderate print fade              |
| Super Agitene®                 | No visible effect                       | Severe print fade, print legible |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                       | Severe print fade, print legible |
| Deionized Water                | No visible effect                       | No visible effect                |
| 3% Alconox® Detergent          | No visible effect                       | Slight print fade                |
| 5% Salt Water Solution         | No visible effect                       | Slight print fade                |

B-342 white samples were laser marked with a 10 watt fiber laser and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE                   |                        |
|--------------------------------|-----------------------------------------------------------|------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB                      | PRINTING WITH SWAB RUB |
| Methyl Ethyl Ketone            | No visible effect                                         | No visible effect      |
| Isopropyl Alcohol              | No visible effect                                         | No visible effect      |
| JP-8 Jet Fuel                  | No visible effect                                         | No visible effect      |
| Kerosene                       | No visible effect                                         | No visible effect      |
| Mil 5606 Oil                   | Tubing stained red, no visible effect on laser marking    | No visible effect      |
| Mil 7808 Oil                   | No visible effect                                         | No visible effect      |
| Speedi Kut Cutting Oil 332     | No visible effect                                         | No visible effect      |
| Gasoline                       | No visible effect                                         | No visible effect      |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on laser marking | No visible effect      |
| Skydrol® 500B-4                | No visible effect                                         | No visible effect      |
| Propylene Glycol               | No visible effect                                         | No visible effect      |
| Super Agitene®                 | No visible effect                                         | No visible effect      |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                         | No visible effect      |
| Deionized Water                | No visible effect                                         | No visible effect      |
| 3% Alconox® Detergent          | No visible effect                                         | No visible effect      |
| 5% Salt Water Solution         | No visible effect                                         | No visible effect      |

#### **Shelf Life:**

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 AS23053/5. 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.

#### **Trademarks:**

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

Alconox® is a registered trademark of Alconox Co.

All S.I. Units (metric) are mathematically derived from the U.S. Conventional

BIOACT® is a registered trademark of Petroferm, Inc.

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

PermaSleeve® is a registered trademark of Brady Worldwide, Inc.

Rust Veto® is a registered trademark of the E.F. Houghton & Co.

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

Skydrol® is a registered trademark of the Monsanto Company

Super Agitene® is a registered trademark of Graymills Corporation

UL: Underwriters Laboratories Inc. (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.

Product compliance information is based upon information provided by suppliers of the raw materials used by Brady to manufacture this product or based on results of testing using recognized analytical methods performed by a third party, independent laboratory. As such, Brady makes no independent representations or warranties, express or implied, and assumes no liability in connection with the use of this information.

## **WARRANTY**

Brady products are sold with the understanding that the buyers will test them in actual use and determine for themselves their adaptability to their intended uses. Brady warrants to the buyers that its products are free from defects in material and workmanship, but limits its obligation under this warranty to replacement of the product shown to Brady's satisfaction to have been defective at the time Brady sold it. This warranty does not extend to any persons obtaining the product from the buyers. This warranty is in lieu of any other warranty, express or implied, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose, and of any other obligations or liability on Brady's part. Under no circumstances will Brady be liable for any loss, damage, expense, or consequential damages of any kind arising in connection with the use, or inability to use, Brady's products.

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Brady North America | 6555 W. Good Hope Rd | Milwaukee, WI 53223 | USA | Tel: 414-358-6600 | Fax: 800-292-2289

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#### 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 Series R6600 for thermal transfer printing best smear and chemical resistance

Brady Series R4300 for thermal transfer printing general purpose ribbon

Brady Series R4502S for thermal transfer printing silver on dark colored markers

Brady Series R6700 for thermal transfer printing white on dark colored markers

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**UL:** B-342 is a UL Recognized Component to UL224 Extruded Insulated Tubing. See UL file E333786 for specific details.

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In Canada: [www.bradycanada.ca/weee-rohs](http://www.bradycanada.ca/weee-rohs)

In Europe: [www.bradyeurope.com/rohs](http://www.bradyeurope.com/rohs)

In Japan: [www.bradyc.co.jp/products/labelsuse/rohs](http://www.bradyc.co.jp/products/labelsuse/rohs)

All other regions: [www.bradyc.com/weee-rohs](http://www.bradyc.com/weee-rohs)

### SPECIAL FEATURES

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| 1/8"        | 3PS-125, 3UPS-125   | 0.046 - 0.110                | 1.17 - 2.79                  |
| 3/16"       | 3PS-187, 3UPS-187   | 0.062 - 0.150                | 1.57 - 3.81                  |
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| 1/2"        | 3PS-500, 3UPS-500   | 0.187 - 0.450                | 4.75 - 11.43                 |
| 3/4"        | 3PS-750, 3UPS-750   | 0.250 - 0.700                | 6.35 - 17.78                 |
| 1"          | 3PS-1000, 3UPS-1000 | 0.375 - 0.950                | 9.53 - 24.13                 |
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Shrink Method: Any industrial grade heat gun may be used to shrink B-342 PermaSleeve® Markers.

| PHYSICAL PROPERTIES                                                                                                                           | TEST METHODS                                                                                                                        | AVERAGE RESULTS                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| Specific Optical Density of Smoke (Ds)<br>Tested at an outside laboratory<br>White, yellow 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/Yellow:<br>Flaming Mode at 1.5 minutes – 76<br>Flaming Mode at 4.0 minutes – 155<br>Nonflaming Mode at 1.5 minutes – 2<br>Nonflaming Mode at 4.0 minutes – 13<br>Black:<br>Flaming Mode at 1.5 minutes – 92<br>Flaming Mode at 4.0 minutes – 155<br>Nonflaming Mode at 1.5 minutes – 4<br>Nonflaming Mode at 4.0 minutes – 41 |

B-342 white, yellow and other colors tested/printed with R5000 Series dot matrix and R4300 and R6600 Series thermal transfer ribbons. B-342 black samples tested printed with R4502S silver and R6700 white thermal transfer ribbon. B-342 white samples were also laser marked with a 10 watt fiber laser. Results are the same with all processes and ribbons unless stated otherwise. White, yellow, and black data listed below, other color data available upon request.

| PERFORMANCE PROPERTIES                      | TEST METHODS                                                                                                                                                                                                                                       | AVERAGE RESULTS                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Service Temperatures                   | 5 minutes at 500°F (260°C)<br><br>24 hours at 350°F (180°C)<br><br>1000 hours at 267°F (130°C)                                                                                                                                                     | White: Slight tube darkening and yellowing<br>Yellow: Moderate tube darkening. Black: No visible effect to tubing, slight print yellowing (R6700).<br><br>White and yellow: Slight tube darkening.<br><br>White and yellow: Moderate tube darkening.<br><br>No visible change to printing in above conditions (R4300, R6600, and laser marking) |
| Low Service Temperature                     | 1000 hours at -94°F (-70°C)                                                                                                                                                                                                                        | No visible effect                                                                                                                                                                                                                                                                                                                               |
| Weatherability                              | ASTM G155 Cycle 1<br>1000 hours in Xenon Arc<br>Weatherometer                                                                                                                                                                                      | White: Slight tube yellowing Yellow: No visible effect<br>No visible change to printing                                                                                                                                                                                                                                                         |
| UV Light Resistance                         | ASTM G155 Cycle 1 dry 1000 hours                                                                                                                                                                                                                   | White: Moderate tube yellowing Yellow: No visible effect<br>No visible change to printing                                                                                                                                                                                                                                                       |
| Humidity Resistance                         | 1000 hours at 100°F/95% R.H.                                                                                                                                                                                                                       | No visible effect                                                                                                                                                                                                                                                                                                                               |
| Salt Fog                                    | 1000 hours in 5% Salt Fog Chamber per ASTM B117                                                                                                                                                                                                    | Moderate print fade (R4502S on black marker).<br>No visible effect to all other color/ribbon combinations and laser marking.                                                                                                                                                                                                                    |
| Dielectric Strength                         | ASTM D2671 (after unrestricted shrink)                                                                                                                                                                                                             | 500 volts/mil minimum                                                                                                                                                                                                                                                                                                                           |
| Flammability                                | ASTM D2671, Procedure B                                                                                                                                                                                                                            | Self-extinguishing within 60 seconds                                                                                                                                                                                                                                                                                                            |
| Print Adherence per SAE-AS81531 (Sec 3.4.2) | Samples tested after unrestricted shrink at 200°C for 3 minutes<br><br>20 eraser rubs with hard hand pressure                                                                                                                                      | Print is still easily legible on sleeves printed with all ribbons and laser marking.                                                                                                                                                                                                                                                            |
| Solvent Resistance                          | MIL-STD-202 method 215K with Change 1, 3 cycles of 3 minute immersions in specified fluids followed by toothbrush rub after each immersion<br><br>B342 white printed with R4300 and R6600, tested after unrestricted shrink at 200°C for 3 minutes | No visible effect                                                                                                                                                                                                                                                                                                                               |



B-342 white, yellow and other colors were dot matrix printed using Brady R5000 Series ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE                                     |                                    |
|--------------------------------|-----------------------------------------------------------------------------|------------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB                                        | PRINTING WITH SWAB RUB             |
| Methyl Ethyl Ketone            | No visible effect                                                           | Severe print fade, print legible   |
| Isopropyl Alcohol              | No visible effect                                                           | Severe print fade, print legible   |
| JP-8 Jet Fuel                  | No visible effect                                                           | Severe print fade, print legible   |
| Kerosene                       | No visible effect                                                           | Severe print fade, print legible   |
| Mil 5606 Oil                   | White and yellow tubing stained red on edges, no visible effect on printing | Severe print fade, print legible   |
| Mil 7808 Oil                   | No visible effect                                                           | Severe print fade, print legible   |
| Speedi Kut Cutting Oil 332     | No visible effect                                                           | Moderate print fade, print legible |
| Gasoline                       | No visible effect                                                           | Severe print fade, print legible   |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on printing                        | Severe print fade, print legible   |
| Skydrol® 500B-4                | No visible effect                                                           | Severe print fade, print legible   |
| Propylene Glycol               | No visible effect                                                           | Moderate print fade, print legible |
| Super Agitene®                 | No visible effect                                                           | Severe print fade, print legible   |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                                           | Severe print fade, print legible   |
| Deionized Water                | No visible effect                                                           | No visible effect                  |
| 3% Alconox® Detergent          | No visible effect                                                           | No visible effect                  |
| 5% Salt Water Solution         | No visible effect                                                           | No visible effect                  |

B-342 white, yellow and other colors were thermal transfer printed using the Brady Series R4300 ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE              |                                    |
|--------------------------------|------------------------------------------------------|------------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB                 | PRINTING WITH SWAB RUB             |
| Methyl Ethyl Ketone            | No visible effect                                    | Severe print fade, print legible   |
| Isopropyl Alcohol              | No visible effect                                    | Severe print fade, print legible   |
| JP-8 Jet Fuel                  | No visible effect                                    | Severe print fade, print legible   |
| Kerosene                       | No visible effect                                    | Severe print fade, print legible   |
| Mil 5606 Oil                   | Tubing stained red, no visible effect on printing    | Severe print fade, print legible   |
| Mil 7808 Oil                   | No visible effect                                    | Severe print fade, print legible   |
| Speedi Kut Cutting Oil 332     | No visible effect                                    | Moderate print fade, print legible |
| Gasoline                       | No visible effect                                    | Severe print fade, print legible   |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on printing | Severe print fade, print legible   |
| Skydrol® 500B-4                | No visible effect                                    | Severe print fade, print legible   |
| Propylene Glycol               | No visible effect                                    | Slight print fade, print legible   |
| Super Agitene®                 | No visible effect                                    | Severe print fade, print legible   |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                    | Severe print fade, print legible   |
| Deionized Water                | No visible effect                                    | No visible effect                  |
| 3% Alconox® Detergent          | No visible effect                                    | Slight print fade, print legible   |
| 5% Salt Water Solution         | No visible effect                                    | Slight print fade, print legible   |

B-342 white and yellow were thermal transfer printed using the Brady Series R6600 ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT    | SUBJECTIVE OBSERVATION OF VISUAL CHANGE |                                    |
|---------------------|-----------------------------------------|------------------------------------|
|                     | TUBING AND PRINTING WITHOUT SWAB RUB    | PRINTING WITH SWAB RUB             |
| Methyl Ethyl Ketone | No visible effect                       | Moderate print fade, print legible |
| Isopropyl Alcohol   | No visible effect                       | No visible effect                  |
| JP-8 Jet Fuel       | No visible effect                       | Moderate print fade, print legible |
| Kerosene            | No visible effect                       | Moderate print fade, print legible |

|                                |                                                            |                                       |
|--------------------------------|------------------------------------------------------------|---------------------------------------|
| Mil 5606 Oil                   | Tubing stained red on edges, no visible effect on printing | Slight print fade, print legible      |
| Mil 7808 Oil                   | No visible effect                                          | No visible effect                     |
| Speedi Kut Cutting Oil 332     | No visible effect                                          | No visible effect                     |
| Gasoline                       | No visible effect                                          | Moderate print fade, print legible    |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on printing       | Slight print fade, print legible      |
| Skydrol® 500B-4                | No visible effect                                          | Slight print fade, print legible      |
| Propylene Glycol               | No visible effect                                          | No visible effect                     |
| Super Agitene®                 | No visible effect                                          | Moderate print fade, print legible    |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                          | Severe print fade, print just legible |
| Deionized Water                | No visible effect                                          | No visible effect                     |
| 3% Alconox® Detergent          | No visible effect                                          | No visible effect                     |
| 5% Salt Water Solution         | No visible effect                                          | No visible effect                     |

B-342 black samples were thermal transfer printed using the Brady Series R4502S silver ribbon and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE |                                  |
|--------------------------------|-----------------------------------------|----------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB    | PRINTING WITH SWAB RUB           |
| Methyl Ethyl Ketone            | No visible effect                       | Severe print fade, print legible |
| Isopropyl Alcohol              | No visible effect                       | No visible effect                |
| JP-8 Jet Fuel                  | No visible effect                       | Severe print fade, print legible |
| Kerosene                       | No visible effect                       | Severe print fade, print legible |
| Mil 5606 Oil                   | No visible effect                       | Severe print fade, print legible |
| Mil 7808 Oil                   | No visible effect                       | Severe print fade, print legible |
| Speedi Kut Cutting Oil 332     | No visible effect                       | No visible effect                |
| Gasoline                       | No visible effect                       | Severe print fade, print legible |
| Rust Veto® 377                 | No visible effect                       | Severe print fade, print legible |
| Skydrol® 500B-4                | No visible effect                       | Severe print fade, print legible |
| Propylene Glycol               | No visible effect                       | Moderate print fade              |
| Super Agitene®                 | No visible effect                       | Severe print fade, print legible |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                       | Severe print fade, print legible |
| Deionized Water                | No visible effect                       | No visible effect                |
| 3% Alconox® Detergent          | No visible effect                       | Slight print fade                |
| 5% Salt Water Solution         | No visible effect                       | Slight print fade                |

B-342 black samples were thermal transfer printed using the Brady Series R6700 white ribbon and shrunk on appropriate size wires. Test 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 after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE |                                  |
|--------------------------------|-----------------------------------------|----------------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB    | PRINTING WITH SWAB RUB           |
| Methyl Ethyl Ketone            | No visible effect                       | Severe print fade, print legible |
| Isopropyl Alcohol              | No visible effect                       | Severe print fade, print legible |
| JP-8 Jet Fuel                  | No visible effect                       | Severe print fade, print legible |
| Kerosene                       | No visible effect                       | Severe print fade, print legible |
| Mil 5606 Oil                   | No visible effect                       | Complete print removal           |
| Mil 7808 Oil                   | No visible effect                       | Severe print fade, print legible |
| Speedi Kut Cutting Oil 332     | No visible effect                       | Moderate print fade              |
| Gasoline                       | No visible effect                       | Severe print fade, print legible |
| Rust Veto® 377                 | No visible effect                       | Severe print fade, print legible |
| Skydrol® 500B-4                | No visible effect                       | Severe print fade, print legible |
| Propylene Glycol               | No visible effect                       | Moderate print fade              |
| Super Agitene®                 | No visible effect                       | Severe print fade, print legible |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                       | Severe print fade, print legible |
| Deionized Water                | No visible effect                       | No visible effect                |
| 3% Alconox® Detergent          | No visible effect                       | Slight print fade                |
| 5% Salt Water Solution         | No visible effect                       | Slight print fade                |

B-342 white samples were laser marked with a 10 watt fiber laser and shrunk on appropriate size wires. Test 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 cotton swab after final immersion.

| CHEMICAL REAGENT               | SUBJECTIVE OBSERVATION OF VISUAL CHANGE                   |                        |
|--------------------------------|-----------------------------------------------------------|------------------------|
|                                | TUBING AND PRINTING WITHOUT SWAB RUB                      | PRINTING WITH SWAB RUB |
| Methyl Ethyl Ketone            | No visible effect                                         | No visible effect      |
| Isopropyl Alcohol              | No visible effect                                         | No visible effect      |
| JP-8 Jet Fuel                  | No visible effect                                         | No visible effect      |
| Kerosene                       | No visible effect                                         | No visible effect      |
| Mil 5606 Oil                   | Tubing stained red, no visible effect on laser marking    | No visible effect      |
| Mil 7808 Oil                   | No visible effect                                         | No visible effect      |
| Speedi Kut Cutting Oil 332     | No visible effect                                         | No visible effect      |
| Gasoline                       | No visible effect                                         | No visible effect      |
| Rust Veto® 377                 | Tubing stained orange, no visible effect on laser marking | No visible effect      |
| Skydrol® 500B-4                | No visible effect                                         | No visible effect      |
| Propylene Glycol               | No visible effect                                         | No visible effect      |
| Super Agitene®                 | No visible effect                                         | No visible effect      |
| BIOACT® EC-7R™ Terpene Cleaner | No visible effect                                         | No visible effect      |
| Deionized Water                | No visible effect                                         | No visible effect      |
| 3% Alconox® Detergent          | No visible effect                                         | No visible effect      |
| 5% Salt Water Solution         | No visible effect                                         | No visible effect      |

#### **Shelf Life:**

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 AS23053/5. 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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