LinkSolutions

# LSA

# Dual Wall Adhesive-Lined Heat-Shrink Polyolefin Tubing

**TECHNICAL DATA SHEET**
Revision Number. 1
Last Edited 26. september 2024

3:1
4:1
UL
125°
ADHE-SIVE

RoHS COMPLIANT
REACH COMPLIANT

Adhesive-coated heat shrink tubing provides environmentally friendly sealing properties for a wide range of electrical applications, such as automotive and marine wiring harnesses, cable joints, disconnects, and transitions between connectors and cables. This adhesive-lined tubing delivers excellent protection against water, moisture, and other contaminants.

The internal adhesive bonds securely to plastics, steel, and polyethylene, while the flame-retardant outer sheath ensures added safety. With a continuous operating temperature range of -45°C to 125°C and a shrinkage temperature of at least 125°C, it complies with UL E361238 standards for high performance and durability.

## Industry

Industry
Marine
Wind power
Commercial
Aerospace
Construction
Automotive
Electrical installations
Telecom

### STANDARD STOCK COLOR

### NORMAL COLOR

### SPECIAL COLOR

### MATERIAL
Extruded, cross linked polyolefin.

### SHRINK RATIO
3:1 / 4:1

### OPERATING TEMPERATURE
-45°C to +125°C
(-113°F to 257°F)

### SHRINK TEMPERATURE
>90°C (130°F)

### FLAMMABILITY
UL224 VW-1 125°C (257°F) 600V
File No. UL E361238

### STORAGE
Cool and dry in original packaging. Recommended temperature at +10°C (50°F) to +25°C (77°F) and 45-55% relative humidity. Use within 2 years from date of manufacture.

### APPLICATIONS
Specific developed to be used in Automotive, Aerospace, industrial, electronics, cable harnesses, insulation, wire bundling, mechanical protection, windpower, marine, commercial electronics, constructions and telecom.

# Product Dimensions

## DIMENSIONS 3:1

| SIZE (D), MM | INNER DIAMETER MM (D) BEFORE REVORY | INNER DIAMETER MAX MM (d) AFTER RECOVERY | WALL THICKNESS NOM MM (W) AFTER RECOVERY | ADHESIVE THICKNESS NOM MM (W) AFTER RECOVERY | SPOOL LENGTH M/ SPOOL |
|---|---|---|---|---|---|
| 2,4 | 2,4 | 0,8 | 0,85 ± 0,15 | 0,40 ± 0,10 | 200 |
| 3,2 | 3,2 | 1,0 | 0,95 ± 0,15 | 0,40 ± 0,10 | 200 |
| 4,8 | 4,8 | 1,6 | 1,10 ± 0,15 | 0,40 ± 0,10 | 100 |
| 6,4 | 6,4 | 2,2 | 1,20 ± 0,15 | 0,45 ± 0,12 | 100 |
| 7,9 | 7,9 | 2,7 | 1,35 ± 0,15 | 0,50 ± 0,12 | 100 |
| 9,5 | 9,5 | 3,2 | 1,45 ± 0,20 | 0,50 ± 0,12 | 50 |
| 12,7 | 12,7 | 4,2 | 1,70 ± 0,20 | 0,50 ± 0,12 | 1,22 OR 25M/ROLL |
| 15 | 15 | 5,2 | 1,80 ± 0,20 | 0,55 ± 0,15 | 1,22 OR 25M/ROLL |
| 19,1 | 19,1 | 6,3 | 2,00 ± 0,20 | 0,55 ± 0,15 | 1,22 OR 25M/ROLL |
| 25,4 | 25,4 | 8,5 | 2,10 ± 0,25 | 0,55 ± 0,15 | 1,22 OR 25M/ROLL |
| 30 | 30 | 10,2 | 2,20 ± 0,25 | 0,60 ± 0,15 | 1,22 OR 25M/ROLL |
| 39 | 39 | 13,5 | 2,40 ± 0,25 | 0,60 ± 0,15 | 1,22 OR 25M/ROLL |
| 50 | 50 | 17 | 2,70 ± 0,25 | 0,70 ± 0,15 | 1,22 OR 25M/ROLL |
| 64 | 64 | 21 | 3,00 ± 0,30 | 0,70 ± 0,15 | 1,22 OR 25M/ROLL |
| 75 | 75 | 25 | 3,00 ± 0,30 | 1,00 ± 0,20 | 1,22 OR 25M/ROLL |
| 90 | 90 | 30 | 3,00 ± 0,30 | 1,00 ± 0,20 | 1,22 OR 25M/ROLL |
| 100 | 100 | 34 | 3,00 ± 0,30 | 1,00 ± 0,20 | 1,22 OR 25M/ROLL |
| 125 | 125 | 42 | 3,00 ± 0,30 | 1,00 ± 0,20 | 1,22 OR 25M/ROLL |

## TECHNICAL DATA

| PROPERTY | TEST METHOD | STANDARD PERFORMANCE |
|---|---|---|
| Tensile strength (MPa) | ASTM D 2671 | ≥10,4 |
| Ultimate elongation (%) | ASTM D 2671 | ≥300 |
| Tensile strength after | UL224 158°C x 168h | ≥7,3 |
| Ultimate elongation after | UL224 158°C x 168h | ≥200 |
| Flammability | ASTM D 2671 B | Self-extinguisk within 30s |
| Dielectris strength (kV/mm) | IEC243 | ≥15 |
| Volume resistivity (Ω*cm) | ASTM D 876 | $\geq 1X10^{14}$ |

# Product Dimensions

## DIMENSIONS 4:1

| SIZE (D), MM | INNER DIAMETER MM (D) BEFORE REVORY | INNER DIAMETER MAX MM (d) AFTER RECOVERY | WALL THICKNESS NOM MM (W) AFTER RECOVERY | ADHESIVE THICKNESS NOM MM (W) AFTER RECOVERY | SPOOL LENGTH M/ SPOOL |
|---|---|---|---|---|---|
| 4,0 | 4,0 | 1,0 | 1,05 ± 0,30 | 0,50 ± 0,30 | 200 |
| 6,0 | 6,0 | 1,5 | 1,15 ± 0,30 | 0,50 ± 0,30 | 100 |
| 8,0 | 8,0 | 2,0 | 1,55 ± 0,30 | 0,60 ± 0,30 | 50 |
| 12,0 | 12,0 | 3,0 | 1,75 ± 0,30 | 0,60 ± 0,30 | 1,22 OR 25M/ROLL |
| 16,0 | 16,0 | 4,0 | 2,00 ± 0,30 | 0,70 ± 0,30 | 1,22 OR 25M/ROLL |
| 20,0 | 20,0 | 5,0 | 2,30 ± 0,40 | 0,70 ± 0,30 | 1,22 OR 25M/ROLL |
| 24,0 | 24,0 | 6,0 | 2,60 ± 0,40 | 0,75 ± 0,30 | 1,22 OR 25M/ROLL |
| 32,0 | 32,0 | 8,0 | 3,00 ± 0,40 | 0,90 ± 0,30 | 1,22 OR 25M/ROLL |
| 52,0 | 52,0 | 13,0 | 3,35 ± 0,40 | 0,95 ± 0,30 | 1,22 OR 25M/ROLL |

## TECHNICAL DATA

| PROPERTY | TEST METHOD | STANDARD PERFORMANCE | TYPICAL PERFORMANCE |
|---|---|---|---|
| Tensile strength (MPa) | ASTM D 2671 | ≥10,4 | 12,68 |
| Ultimate elongation (%) | ASTM D 2671 | ≥200 | 448,72 |
| Tensile strength after | UL224 158°C x 168h | ≥7,3 | 11,45 |
| Ultimate elongation after | UL224 158°C x 168h | ≥100 | 390,41 |
| Flammability | ASTM D 2671 B | Pass | Pass |
| Dielectris strength (kV/mm) | IEC 60243 | ≥15 | 18,25 |
| Volume resistivity (Ω*cm) | IEC 60093 | $\geq 1X10^{14}$ | $\geq 1,68X10^{14}$ |

# General Tests

## PHYSICAL

| PROPERTIES | TEST METHOD | TYPICAL VALUE |
|---|---|---|
| Tensile strength | ASTM D 638 | 13.00 MPA |
| Elongation at break | ASTM D 638 | ≥400% |
| Longitudinal change | SAE AS23053 | -7% |
| Specific gravity | ASTM D 792 | 1,34 |
| Secant Modulus | ASTM D 882 | 65 MPa |

## ELECTRICAL

| PROPERTIES | TEST METHOD | TYPICAL VALUE |
|---|---|---|
| Dielectric strength | ASTM D876 | ≥30.00 kV/mm |
| Volume resistivity | ASTM D876 | 3.10 x$10^{14}$ Ω/cm |
| Voltage Rating | UL 224 | 600Volt |
| Dielectric Voltage Withstand (2.5kV x 60s) | UL 224 | Pass no breakdown |

## CHEMICAL

| PROPERTIES | TEST METHOD | TYPICAL VALUE |
|---|---|---|
| Water absorbtion | ASTM D 570 | 0,25% |
| Copper corrosion (158°C x 168h) | SAE AS23053 | No corrosion |
| Stability against copper (158°C x 168) | SAE AS23053 | Elongation min 100% - Pass |
| Fluid Resistance (after immersion 24°C x24h) | SAE AS23053 | 7,25-14 MPa Min 6,9 MPa (Tensile Strength) |
| Fungus Resistance | SAE AS23053 requirement ASTM G21 | Pass |
| Ozone resistance | NF F 00-608 | No cracking or sweating - Pass |

## THERMAL

| PROPERTIES | TEST METHOD | TYPICAL VALUE |
|---|---|---|
| Heat shock 4 hours at 250°C | SAE AS23053 | No dripping, cracking or flowing - Pass |
| Heat aging 168 hours at 158°C | SAE AS23053 | Elongation ≥400% |
| Flammability | UL224 | VW-1 Pass » Flame retardant |
| Low temperature flexibility / Bending (-55°C x 4h) | UL 224 | No cracking, no break, pass |

# Environmental UV Stability

| PROPERTIES | TEST METHOD | TYPICAL VALUE |
|---|---|---|
| UV-A | ASTM G154 - Machine setup Temp 50-60°C (140°F) Cycle 8 h light 4h condensation UV wavelength 280-400nm Test duration 1000 h of exposure. | Pass - No damage to the marker and print legible after 20 rubs in accordance with SAE-AS 815314.6.2 |

# Product code

LSA - 3X/4X - 024 -M/mm- >

**FAMILY**

**SHRINK RATIO**
3x = 3:1
4x = 4:1

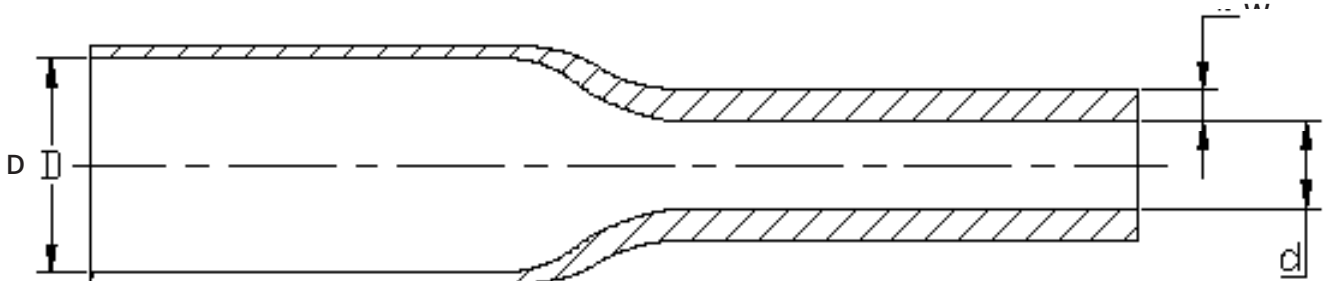
**DIAMETER IN MM**
024 = 2.4mm - 3/32 inches
032 = 3.2mm - 1/8 inches

**LENGTH**
Length in meters (M) or millimeters (mm)

**COLORS**

# Color codes

- BLACK
- BROWN
- BLUE
- CLEAR
- GREEN
- GREEN / YELLOW
- GREY
- ORANGE
- PINK
- RED
- VIOLET
- YELLOW




Heat Shrink Product in as supplied "D" and fully recovered state "d" with recovered wall "w"

# Related Standard Test Methods And Documents

| Document | Description |
|---|---|
| ASTM D 570 | Water absorbtion |
| ASTM D638 | Heat aging 168 at 158°C |
| ASTM D 638 | Tensile strength testing |
| ASTM D 638 | Elongation at break testing |
| ASTM D 792 | Specific gravity |
| ASTM D 876 | Dialectrical strength |
| ASTM D 876 | Volume resistivity |
| ASTM D 882 | Secant modulus |
| ASTM D257 -IEC 93 | Volume resistivity Ω-cm |
| SAE AS23053 | Insulation Sleeving, Electrical, Heat Shrinkable, General Specification for marking of electrical insulation materials |
| NF F00-608:1995 | This document defines the characteristics, testing, certification of heat-shrinkable sleeve marker for mechanical and electrical protection used in railway equipment. |
| UL224 VW-1 | This Standard specifies the requirements for insulating tubing that is usually round in cross-section and that consists entirely of extruded compounds whose characteristic constituents are thermosetting, elastomeric, or thermoplastic polymers (see Table 1 for materials and ratings). These requirements also cover heat-shrinkable and crosslinked tubing. |