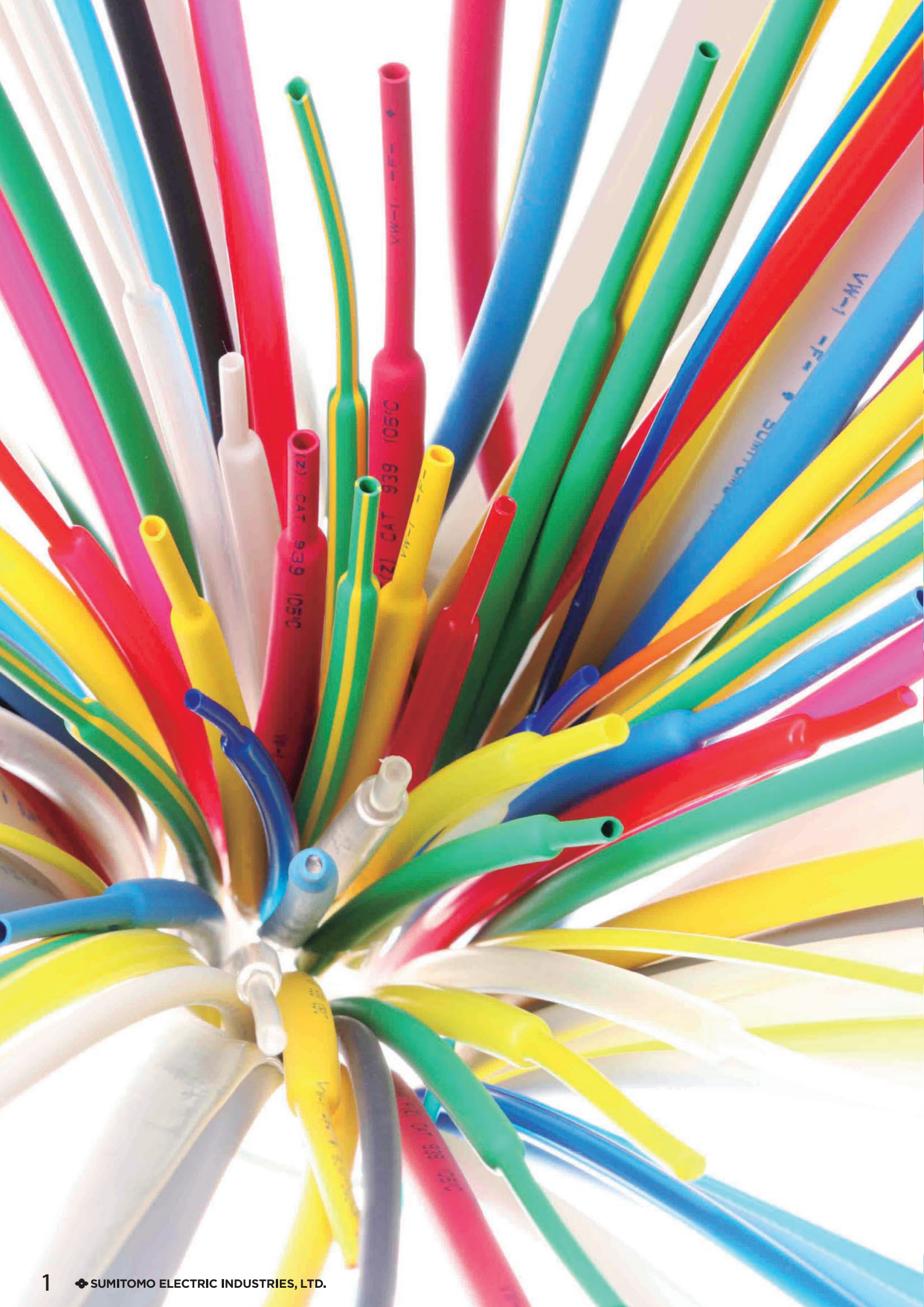


SUMITUBE™
IRRAX™ SLEEVE
IRRAX™ TUBE
IRRAX™ TAPE





Sumitomo Electric's irradiated products have been contributing to the development of the electronic equipment, automobile, aviation, and various other industries.

SUMITUBE™

SUMITUBE is a heat-shrinkable tube (that shrinks in the radial direction when heated) that takes advantage of the shape-memory effect of plastics enhanced by electron beam irradiation. Made mainly from raw materials such as polyolefin, fluorinated polymer, or thermoplastic elastomer, SUMITUBE is widely used in various industrial fields for bundling, thermal protection, and insulation protection of electrical wires and harnesses, as well as for other purposes.

IRRAX™TUBE IRRAX™TAPE

IRRAXTUBE is a heat-resistant tube that takes advantage of heat/chemical resistance of a plastic enhanced by electron beam irradiation. Made mainly from raw materials such as polyolefin, fluorinated polymer, or thermoplastic elastomer, IRRAXTUBE is widely used in various industrial fields for thermal protection, mechanical protection, and chemical protection of electrical wires and harnesses and for various other purposes.

IRRAX™SLEEVE

IRRAXSLEEVE is a relatively large bore heat-shrinkable tube made from cross-linked plastic. IRRAXSLEEVE is used for protecting pipes and cables in infrastructure applications. A heat-shrinkable tube with a hot-melt adhesive inner liner that provides a waterproof seal after shrinking.

SUMITUBE™

A
C
A4
SUMITUBE LA
C (UL)
D
A2

SUMITUBE B
LB

F (Z)
F3 (Z)
SUMITUBE NHR2
NHR4
V (300V)
V (600V)

SUMITUBE F2 (Z)
F4 (Z)
B2
B2 (3X)
B8

SUMITUBE K
K2

SUMITUBE KH200 (TW)

SUMITUBE KH230 (TW)

B6
SUMITUBE R
AN25

SUMITUBE W

SUMITUBE O2C
W3C

O2B2
W3F2
SUMITUBE W3B2
W3B2 (4X)
SA2
SA3

IRRAX™TUBE IRRAX™TAPE

A
B
F2
F2 (UL)
IRRAXTUBE V2
RP3
B8
ER2
NHR
FE2
IRRAXTAPE VZL

IRRAX™SLEEVE

SCM2
IRRAXSLEEVE SBI
300/350
SNHM

Composite articles

SUMISEAL
SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

General Information

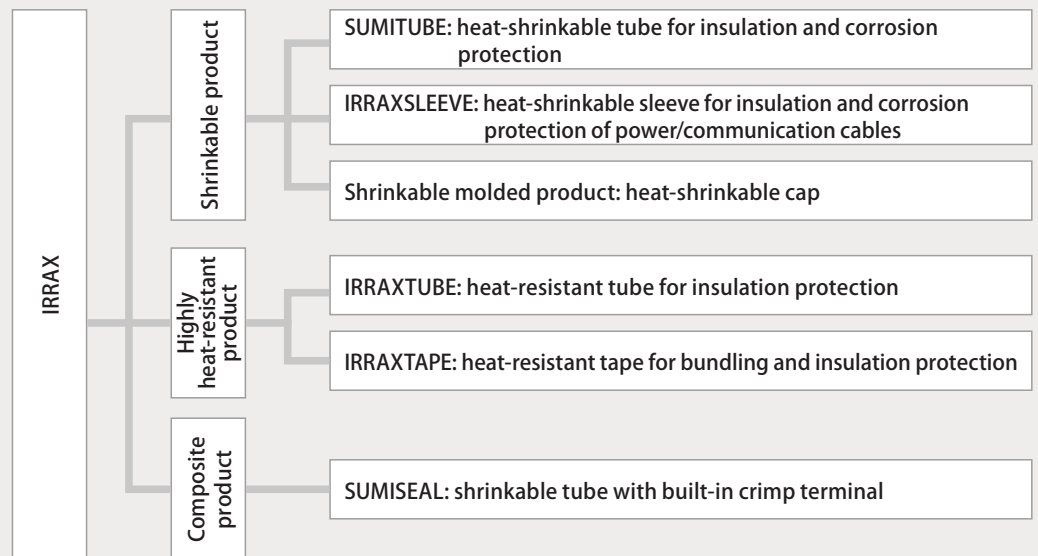
Introduction

When irradiated with an electron beam (a flow of electrons that are accelerated in a vacuum using a high voltage), certain plastic materials develop cross-linkage (a reaction that creates new chemical bonds between plastic molecules). As a result, the heat resistance, shape-memory effect, oil/chemical resistance, and various other properties of the plastic are improved.

Since Japan's first installation of an industrial electron beam generator on Sumitomo Electric's premises in 1964, the company has put its resources into developing and commercializing various products using its original electron beam irradiation technology for plastics.

IRRAX™

IRRAX is Sumitomo Electric's trade name for heat-resistant plastics and shape-memory plastics produced by Sumitomo Electric Fine Polymer, Inc. The molecules of these plastics are cross-linked (given a 3D network structure) by electron beam irradiation, thereby enhancing the reliability in use of these plastics, which have superior heat resistance and liquid (oil and chemical) resistance.



Designation of UL- and CSA-certified products

If inspectors from UL and CSA require you to show a UL or CSA certificate for a specific tube meeting the requirements of these standards, show them the mark on the surface of each tube or the product label on the package. Sumitomo Electric has introduced a Re-Examination Service system to be followed up by UL and CSA. Therefore, inspectors will never require you to use special tags such as those required for electric cables.

In the past, these safety standards made it compulsory for manufacturers to indicate their company name, temperature rating, and other items on each tube. Though these standards do not require these items to be indicated any more, Sumitomo Electric still indicates these items on each tube as in the past.

UL has disclosed its UL-certified products lists on its website, permitting us to copy them and use the copy as a certificate of authorization. Sumitomo Electric provides copies of these lists for our products that are UL-compliant, and copies of the Certification Record for our products that are CSA-compliant.

“VW-1” is a flame retardance rating specified by the UL224 standard and CSA standard. Only products that have passed a vertical wire flame test are rated at VW-1. In the vertical wire flame test, signified by the acronym VW, the test specimen (tube) with a wire inside is held vertically and burnt. For a VW-1 rating, the flame must go out within one minute. The CSA standard originally specified “OFT” flame retardance rating for tubes. However, this standard adopted the same tube test method as that specified by the UL224 standard and subsequently the rating designation was changed to VW-1.

Some of our customers ask us about the UL94 V-0 flame retardance rating. UL94 is a safety standard that specifies the flame resistance of plastic materials used for making machine parts. A sheetlike specimen is used for the evaluation test. Accordingly, UL94 does not cover the tubes and their auxiliary products shown in this catalog.

VW-1 flame retardance rating

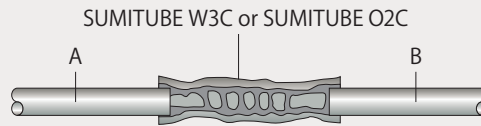
For the maximum allowable continuous operating temperatures of products that comply with safety standards (UL, CSA, SAE-AMS, etc.), this catalog shows the highest temperatures specified in these standards. For the aging resistance and other characteristics of the products manufactured by Sumitomo Electric Fine Polymer, Inc., the company has designed the product specifications after referring to the related UL requirements. For products with an inner adhesive layer (SUMITUBE and IRRAXSLEEVE with an adhesive lining), this catalog shows the maximum allowable continuous operating temperature that has been determined from the material characteristics of the outer layer. Note that these products may be dislocated due to melting of the adhesive if they are exposed to high temperatures.

Maximum allowable continuous working temperature

Product color tones have originally been designed according to Sumitomo Electric’s standards. Note that color tone differs depending on the product model. However, some product models are colored according to the requirements of applicable safety standards.

Color tone

The table below shows the characteristics of two (PVC) lead wires, A and B, with their joint shielded with SUMITUBE W3C or SUMITUBE O2C. SUMITUBE W3F2 and SUMITUBE O2B2 have the same moisture resistance as the above two tubes.



Characteristics of tubes of double layer construction (moisture resistance)

| Item | Test method | Evaluation criteria | | |
|------------------|---|---------------------|----------------------------------|---|
| | | External appearance | Insulation resistance (in water) | Withstand voltage (in oil) |
| Heat resistance | Exposure to 120°C for 24 h | No abnormality | min. 100MΩ | No dielectric breakdown after application of AC1.5kV for 60 s |
| Cold resistance | Exposure to -30°C for 24 h | No abnormality | min. 100MΩ | No dielectric breakdown after application of AC1.5kV for 60 s |
| Water resistance | Immersion in water at 20°C for 2 weeks | No abnormality | min. 100MΩ | No dielectric breakdown after application of AC1.5kV for 60 s |
| Heat cycle | 95°C (in water) ↔ -30°C 20°C (in air) ↔ -30°C Exposure to each temperature for 30 min Repeat this temperature cycle 10 times | No abnormality | min. 100MΩ | No dielectric breakdown after application of AC1.5kV for 60 s |

The shrink ratio is defined as follows:

$$\text{Shrink ratio (\%)} = \frac{(\text{Inside diameter before shrinkage}) - (\text{Inside diameter after complete shrinkage})}{(\text{Inside diameter before shrinkage})} \times 100$$

Most of the products shown in this catalog are designed so that, after they have shrunk completely, their inside diameter will decrease to one half or less of their original inside diameter. This means that the shrink ratio is 50% or more. The larger the shrink ratio, the more noticeably will the products show a reduction in their inside diameter. Products that will reduce their inside diameter to one third, a quarter, or less are also available.

Shrink ratio

General Information

Longitudinal change ratio

Longitudinal change ratio is defined as follows:

$$\text{Longitudinal change ratio (\%)} = \frac{(\text{Tube length after shrinkage}) - (\text{Tube length before shrinkage})}{(\text{Tube length after shrinkage})} \times 100$$

Assume that an originally 100mm long tube reduces in length to 96mm after complete shrinkage, then the longitudinal change ratio of this tube is calculated to be -4%, as follows:

$$\text{Longitudinal change ratio (\%)} = (96 - 100)/100 \times 100 = -4 (\%)$$

Assume that a product with a longitudinal change ratio of "0 ±5%" is heated to shrink completely. Then this product will reduce its length by a maximum of 5% or will increase its length by a maximum of 5%.

The tube may not shrink as completely as it shrinks when heated as a single piece (according to the longitudinal change ratio), depending on the surface characteristics of the wire being sheathed, the clearance between the wire and tube, tube heating temperature and time, and other factors. Determine the length of each heat-shrinkable tube properly according to your use conditions.

Tube shrinking method and cautions to be observed during tube heating

Shrinking method

Insert the object to be sheathed in a tube whose inside diameter is larger than the outside diameter of the object, and heat the tube using one of the following methods. The tube will immediately shrink tightly over the object.

● Heating with an industrial heating tool

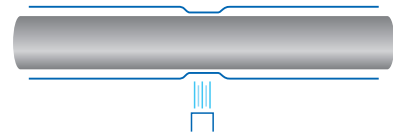
Heat the object along its circumference from one end to the other or from the center to both ends.

● Heating in a high-temperature atmosphere using a thermostatic oven or heating furnace

● Example of heat shrink method -1



● Example of heat shrink method -2



- The shrinkage completion temperatures shown in this catalog represent the temperatures of the tubes themselves. The ambient temperature around the heating spot is preferably 20 to 50°C higher than the tube temperature. However note that the tube heating temperature and time should be controlled according to the specific heat and thermal conductivity of the object being sheathed and the ambient temperature. Determine the optimum tube heating conditions while checking how each tube shrinks.
- The tube may develop cracks when heated locally if the surface of the object being protected has a protrusion or sharp edge or if the tube has been cut non-uniformly and the cut surfaces contain defects such as a slit or diagonally cut section. Although the tube can be used to protect an object whose cross section is angular or irregular rather than circular, a gap may be produced between the tube and any concave surface after the tube is shrunk.

Shrinking a two-layer tube and precautions for use

- When shrinking a two-layer tube with adhesive lining, it is recommended to heat the tube until sufficient adhesive is visible at both tube ends so as to ensure that the tube is reliably waterproof.
- When heat-shrunk, the tube may slip down on the smaller outside diameter side of the object or may become dislocated by a bending load or other external force, resulting in deterioration in the sealing properties of the tube. Before using the tube, always check whether the sealing properties of the tube meet your use conditions.

Tube storage conditions and natural shrinkage of tubes

Heat-shrinkable tubes will not shrink prematurely as long as they are stored at a temperature lower than the shrinkage start temperature. However, we recommend that you store them in a cool dark place. Avoid exposing them to direct sunlight.

SUMITUBE V tends to start shrinking at near 40°C due to the characteristics of the raw material, polyvinyl chloride. Store this tube with special care.

RoHS and ELV Directive

• What is RoHS?

RoHS, which stands for “**Restriction Of the use of certain Hazardous Substances in electrical and electronic equipment,**” is an EU directive issued to restrict the specific hazardous materials found in electrical and electronic products. After being put into effect, this directive bans intentional use of the regulated substances in manufacturing electrical and electronic products to be sold in the European market or inclusion of these substances in these products at concentrations higher than the specified threshold levels, though this directive has set some exemptions. If electrical and electronic products contain any of these hazardous substances at a concentration higher than the regulated threshold level, the governing EU authority may direct the related manufacturer to withdraw such products. The regulated substances and the date of enforcement are as follows:

Regulated substances: (1) lead, (2) mercury, (3) cadmium, (4) hexavalent chromium, certain halogenated flame retardants (5) PBDE and (6) PBB, Phthalates (7)DEHP and (8)DBP and (9)BBP, and (10)DIBP

Date of enforcement: July 1, 2006 (EU directive: 2002/95/EC)

Date of promulgation of amended directive: July 21, 2011 (EU directive: 2011/65/EU)

Sumitomo Electric has actively implemented measures necessary to comply with the RoHS directive. In this catalog, a check mark with “RoHS directive 10 substances” has been added to each header on RoHS-compliant products to express more clearly that these products comply with the directive. Most of the products that are not shown in this catalog comply with this directive. However, contact Sumitomo Electric on a case-by-case basis for compliance of the product models in which you are interested.

• What is the ELV directive?

ELV, which stands for “**End of Life Vehicle,**” is an EU directive that was passed in May 2000 and came into effect in October 2000. The objective of this directive is to facilitate the recycling of end of life vehicles, thereby reducing waste products and mitigating their effects on the environment. The ELV directive restricts the use of almost the same substances as those regulated by the RoHS directive, excepting the halogenated flame retardants.

Regulated substances: (1) lead, (2) mercury, (3) cadmium, and (4) hexavalent chromium

Date of enforcement: October 2000 (EU directive: 2000/53/EC)

The product models, sizes, and color tones shown in this catalog have been standardized and are normally in stock. Products with non-standard models, sizes, and color tones are made to order. Products of non-standard sizes (inside diameter, wall thickness, unit length) and color tones are also available upon request and factory acceptance. For individual inquiries, please contact Sumitomo Electric.

Other information

Warning

The products shown in this catalog have not been developed or commercialized for use in medical or other special fields which are associated (directly) with human life and the body. If you intend to use these products in a special field related to human life or the body, be sure to carry out preliminary safety testing of the particular products by yourself and use them at your own responsibility.

Caution

- (1) The product data in this catalog represent typical values measured from a single product. Features of the products also represent their general physical properties. These data do not guarantee the safety of the products in individual applications. Therefore, you are required to unconditionally check by yourself that the particular products conform to the safety requirements of your particular applications. Please understand that Sumitomo Electric and its affiliates do not assume any responsibility for any accidental or indirect loss. Although shrinking operation for tubing with a large inside diameter for infrastructure applications could be done with a powerful gas torch with thermal adjustment, this operation with such gas torch requires high skill for the method of heating and is dangerous. Therefore, we strongly recommend to use industrial dryers (hot-air equipment) for this operation.
- (2) Since the sealing properties of SUMITUBE and IRRAXSLEEVE with adhesive lining differ depending on their use conditions, first check their sealing properties under your particular use conditions.
- (3) Depending on the storage condition, some compounding agents may precipitate on the surface of the tubes.
- (4) There may be small scratch, uneven and hue fluctuation, on surface of products, although they usually don't affect property for electric insulation, mechanical protection, and bundle use. If you need special surface quality, please contact separately.
- (5) Comply with the use conditions specified in each safety standard.
- (6) Special care is required when shrinking a tube over an object containing a sharp bend, corner, protrusion, or edge. The tube may split.
- (7) Please note that the contents of this catalog are subject to change without prior notice.

SUMITUBE™

| Classification | | | | Product name | Materials | Specifications/Approvals*1 | | | | |
|----------------|----------------|---------------|----------------|-----------------|-------------------|----------------------------|-----|------------------|-------------------|-------------------|
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | A | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | C | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | A4 | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | LA | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | C (UL) | Polyolefin | | UL 105°C | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | D | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | A2 | Polyolefin | | | SAE 135°C | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | B | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | LB | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | F (Z) | Polyolefin | | UL 105°C VW-1 | PSE | -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | F3 (Z) | Polyolefin | | UL 105°C VW-1 | PSE | -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | NHR2 | Polyolefin | | cULus 125°C VW-1 | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | NHR4 | Polyolefin | | UL 125°C VW-1 | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | V (300V) | Polyvinylchloride | | cULus 105°C VW-1 | PSE | -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | V (600V) | Polyvinylchloride | | cULus 105°C VW-1 | PSE | -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | F2 (Z) | Polyolefin | | UL 125°C VW-1 | CSA 125°C VW-1 | PSE -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | F4 (Z) | Polyolefin | | UL 125°C VW-1 | CSA 125°C VW-1 | PSE -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | B2 | Polyolefin | | UL 125°C VW-1 | CSA 125°C VW-1 | SAE 135°C |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | B2 (3X) | Polyolefin | | UL 125°C VW-1 | CSA 125°C VW-1 | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | B8 | Polyolefin | | UL 125°C VW-1 | CSA 125°C VW-1 | PSE -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | K | PVDF | | UL 150°C VW-1 | CSA 150°C VW-1 | SAE 175°C PSE -F- |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | K2 | PVDF | | UL VW-1 | SAE 175°C PSE -F- | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | KH200 (TW) | Fluoroelastomer | | UL 150°C VW-1 | SAE 150°C | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | KH230 (TW) | Fluoroelastomer | | | SAE 150°C | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | B6 | Polyolefin | | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | R | Polyolefin | | | SAE 121°C | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | AN25 | Elastomer | | | SAE 120°C | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | W | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | O2C | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | W3C | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | SUMITUBE | O2B2 | Polyolefin | | UL 125°C | CSA 125°C | SAE 110°C |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | W3F2 | Polyolefin | | UL 125°C | CSA 125°C | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | W3B2 | Polyolefin | | UL 125°C | CSA 125°C | SAE 110°C |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | W3B2 (4X) | | | UL 125°C | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | SA2 | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | SA3 | Polyolefin | SFP | | | |

IRRAX™TUBE / IRRAX™TAPE

| Classification | | | | Product name | Materials | Specifications/Approvals*1 | | | | | |
|----------------|----------------|---------------|----------------|------------------|----------------|----------------------------|-----|---------------|--|---------|--|
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | IRRAXTUBE | A | Polyolefin | SFP | | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | B | Polyolefin | SFP | | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | F2 | Polyolefin | | | PSE | -F- | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | F2 (UL) | Polyolefin | | UL 125°C VW-1 | PSE | -F- | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | V2 | Polyvinylchloride | | UL 105°C VW-1 | CSA 105°C VW-1 | PSE -F- | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | RP3 | Polyolefin | | UL 105°C VW-1 | PSE | -F- | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | B8 | Polyolefin | | UL 125°C VW-1 | PSE | -F- | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | ER2 | Polyolefin | SFP | | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | NHR | Polyolefin | SFP | | Combustion Standards for Railway Vehicle Materials | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | FE2 | Fluoroelastomer | SFP | | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | IRRAXTAPE | VZL | Polyvinylchloride | SFP | | | | |

IRRAX™SLEEVE

| Classification | | | | Product name | Materials | Specifications/Approvals*1 | | | | |
|----------------|----------------|---------------|----------------|--------------------|-------------------|----------------------------|-----|--|--|--|
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | IRRAXSLEEVE | SCM2 | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | SBI300/350 | Polyolefin | SFP | | | |
| Waterproofing | Flame-retarded | UL recognized | SAE recognized | | SNHM | Polyolefin | SFP | | Combustion Standards for Railway Vehicle Materials | |

Product Lineup

| Continuous operating temperature (max.) | Shrink properties | | Oil/Chemical resistance (room temperature)*2 | | | | | | Features | Page | SUMITUBE™ | | |
|---|----------------------------|--------------------------------|--|---------|-----------|---------|------|--------|---|------|--------------------------|--------------|-----|
| | Shrink ratio*2 | Shrinking complete temperature | Gasoline | Gas oil | Lubricant | Alcohol | Acid | Alkali | | | | | |
| 105°C | 1.5 : 1 | 115°C | ○ | ○ | ○ | ◎ | ◎ | ◎ | General purpose | 10 | SUMITUBE | A | |
| 105°C | 1.5 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | Shrinkage at low temperature | 11 | | C | |
| 105°C | 2 : 1 | 110°C | ○ | ○ | ○ | ◎ | ○ | ◎ | Weather resistant | 12 | | A4 | |
| 105°C | 1.5 : 1 | 115°C | ○ | ○ | ○ | ◎ | ◎ | ◎ | Large diameter (Thick wall) | 13 | | LA | |
| 105°C | 1.5 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | UL | 14 | | C (UL) | |
| 135°C | 2 : 1 | 140°C | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Semi-rigid | 15 | | D | |
| 135°C | 2 : 1 | 110°C | ○ | ○ | ○ | ◎ | ○ | ◎ | Transparent | 16 | A2 | | |
| 120°C | 1.5 : 1 | 115°C | ○ | ○ | ○ | ◎ | ◎ | ◎ | Flame-retarded | 17 | SUMITUBE | B | |
| 120°C | 1.5 : 1 | 115°C | ○ | ○ | ○ | ◎ | ◎ | ◎ | Large diameter, flame-retarded (thick wall) | 18 | LB | | |
| 105°C | 2 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | UL, general purpose | 19 | SUMITUBE | F (Z) | |
| 105°C | 2 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | UL, general purpose (thin wall) | 20 | | F3 (Z) | |
| 125°C | 2 : 1 | 100°C | △ | △ | △ | ◎ | ○ | ○ | cULus, halogen-free | 21 | | NHR2 | |
| 125°C | 2 : 1 | 100°C | △ | △ | △ | ◎ | ○ | ○ | UL, halogen-free (thin wall) | 22 | | NHR4 | |
| 105°C | 2 : 1 | 160°C | ○ | ○ | ○ | △ | △ | △ | Flame-retarded, transparent | 23 | | V (300V) | |
| 105°C | 2 : 1 | 160°C | ○ | ○ | ○ | △ | △ | △ | Flame-retarded, transparent | 24 | | V (600V) | |
| 125°C | 2 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | UL / CSA, general purpose | 25 | SUMITUBE | F2 (Z) | |
| 125°C | 2 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | UL / CSA, general purpose (thin wall) | 26 | | F4 (Z) | |
| 135°C | 2 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | Flame-retarded, no marking | 27 | | B2 | |
| 135°C | 3 : 1 | 90°C | △ | △ | △ | ◎ | ○ | ○ | High shrink ratio | 28 | | B2 (3X) | |
| 125°C | 2 : 1 | 130°C | ○ | ○ | ○ | ◎ | ◎ | ◎ | Flame-retarded, semi-rigid | 29 | | B8 | |
| 175°C | 2 : 1 | 170°C | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Highly heat resistant | 30 | | K | |
| 175°C | 2 : 1 | 150°C | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Highly heat resistant | 31 | K2 | | |
| 200°C | 2 : 1 | 150°C | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Transparent, Highly heat resistant | 32 | SUMITUBE | KH200 (TW) | |
| 230°C | 2 : 1 | 150°C | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Highly heat resistant | 32 | SUMITUBE | KH230 (TW) | |
| 135°C | 2 : 1 | 130°C | ○ | ○ | ○ | ◎ | ◎ | ◎ | Flame-retarded, semi-rigid | 33 | SUMITUBE | B6 | |
| 120°C | 2 : 1 | 130°C | ○ | ○ | ○ | ◎ | ○ | ○ | Rubber-like | 34 | | R | |
| 150°C | 2 : 1 | 170°C | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Highly heat resistant, highly oil resistant | 35 | AN25 | | |
| 105°C | 2.4 : 1 | 115°C | △ | △ | △ | ○ | ○ | ○ | Effective filling | 36 | SUMITUBE | W | |
| 105°C | 2 : 1 | 115°C | ○ | ○ | ○ | ○ | ○ | △ | Thin adhesive | 37 | SUMITUBE | O2C | |
| 105°C | 3 : 1 | 115°C | ○ | ○ | ○ | ○ | ○ | △ | Thick adhesive | 38 | W3C | | |
| 125°C | 2 : 1 | 110°C | △ | △ | △ | ○ | ○ | △ | Thin adhesive | 39 | SUMITUBE | O2B2 | |
| 125°C | 3 : 1 | 110°C | △ | △ | △ | ○ | ○ | △ | Thick adhesive | 40 | | W3F2 | |
| 125°C | 3 : 1 | 110°C | △ | △ | △ | ○ | ○ | △ | Thick adhesive | 41 | | W3B2 | |
| 125°C | 4 : 1 | 110°C | △ | △ | △ | ○ | ○ | △ | Thick adhesive, high shrink ratio | 42 | | W3B2 (4X) | |
| 130°C | 4 : 1 | 115°C | ○ | ○ | ○ | ○ | ○ | △ | High shrink ratio, sealing | 43 | | SA2 | |
| 130°C | 4 : 1 | 135°C | ○ | ○ | ○ | ○ | ○ | △ | High shrink ratio, sealing | 44 | | SA3 | |
| Continuous operating temperature (max.) | Shrink properties | | Oil/Chemical resistance (room temperature)*2 | | | | | | Features | Page | IRRAX™TUBE IRRAX™TAPE | | |
| | Shrink ratio | Shrinking complete temperature | Gasoline | Gas oil | Lubricant | Alcohol | Acid | Alkali | | | | | |
| 105°C | — | — | ○ | ○ | ○ | ◎ | ◎ | ◎ | General purpose | 46 | IRRAX™TUBE | A | |
| 120°C | — | — | ○ | ○ | ○ | ◎ | ◎ | ◎ | Flame-retarded | 47 | | B | |
| 125°C | — | — | △ | △ | △ | ◎ | ○ | ○ | Flame-retarded | 48 | | F2 | |
| 125°C | — | — | △ | △ | △ | ◎ | ○ | ○ | UL | 49 | | F2 (UL) | |
| 105°C | — | — | ○ | ○ | ○ | △ | △ | △ | UL / CSA | 50 | | V2 | |
| 105°C | — | — | △ | △ | △ | ◎ | ○ | ○ | Flexible, flame-retarded | 51 | | RP3 | |
| 125°C | — | — | ○ | ○ | ○ | ◎ | ◎ | ◎ | Semi-rigid | 52 | | B8 | |
| 150°C | — | — | ○ | ○ | ○ | ◎ | ◎ | ◎ | Highly heat resistant, flame-retarded | 53 | | ER2 | |
| — | — | — | △ | △ | △ | ◎ | ○ | ○ | Flame-retarded, halogen-free | 54 | | NHR | |
| 200°C | — | — | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | Highly heat resistant, highly oil resistant, flame-retarded | 55 | | FE2 | |
| 105°C | — | — | ○ | ○ | ○ | △ | △ | △ | Flame-retarded | 56 | | IRRAX™TAPE | VZL |
| Continuous operating temperature (max.) | Shrink properties | | Oil/Chemical resistance (room temperature)*2 | | | | | | Features | Page | | IRRAX™SLEEVE | |
| | Shrink ratio | Shrinking complete temperature | Gasoline | Gas oil | Lubricant | Alcohol | Acid | Alkali | | | | | |
| 120°C | 3:1 | 115°C | ○ | ○ | ○ | ○ | ○ | △ | | 58 | IRRAX™SLEEVE | SCM2 | |
| 120°C | 2:1 | 115°C | △ | △ | △ | ○ | ○ | △ | | 59 | | SBI 300/350 | |
| 105°C | 3:1 | 110°C | △ | △ | △ | ○ | ○ | △ | | 60 | | SNHM | |
| Page | Composite articles | | | | | | | | | | | | |
| 62 | SUMISEAL | | | | | | | | | | | | |
| 63 | SUMITUBE SA3 CAP | | | | | | | | | | | | |
| Page | Processing equipment | | | | | | | | | | | | |
| 64 | SUMISHRINKER / HEATING GUN | | | | | | | | | | | | |

*1: Explanations of Specifications/Approvals are as follows.

- SFP : SFP Standard
- UL : UL224
- CSA : CSA C22.2 No.198.1
- cULus : Standard for U.S.A and Canada based on UL224
- SAE : SAE-AS23053 (Formerly SAE-AMS-DTL-23053)
- PSE : Electrical Appliances and Material Safety Act
- Combustion Standards for Railway Vehicle Materials : Combustion Standards for Railway Vehicle Materials by Japan Railway Rolling Stock & Machinery Association

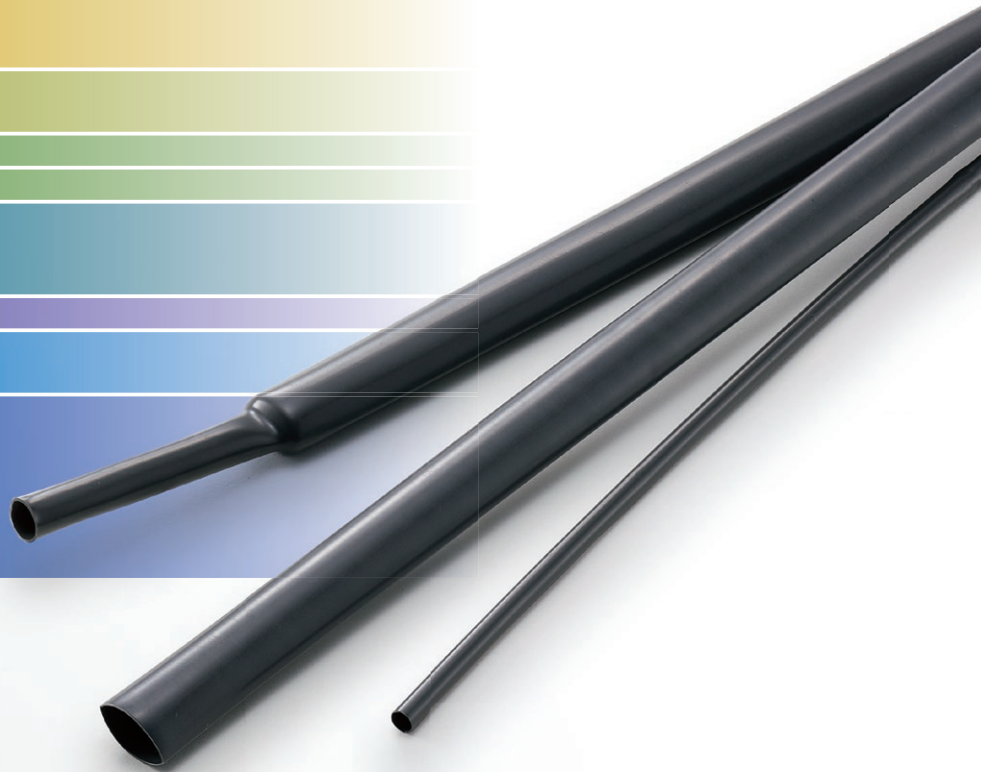
*2: Explanations of figure as follows.

- Inside diameter
- Supplied ID : Recoverd ID

*3: Explanations of symbols are as follows.

- ◎ : Very good
- : Good
- △ : Not applicable in some cases

| | | |
|----------|------------|--|
| SUMITUBE | A | |
| | C | |
| | A4 | |
| | LA | |
| | C (UL) | |
| | D | |
| | A2 | |
| SUMITUBE | B | |
| | LB | |
| SUMITUBE | F (Z) | |
| | F3 (Z) | |
| | NHR2 | |
| | NHR4 | |
| | V (300V) | |
| | V (600V) | |
| | | |
| SUMITUBE | F2 (Z) | |
| | F4 (Z) | |
| | B2 | |
| | B2 (3X) | |
| | B8 | |
| SUMITUBE | K | |
| | K2 | |
| SUMITUBE | KH200 (TW) | |
| SUMITUBE | KH230 (TW) | |
| SUMITUBE | B6 | |
| | R | |
| | AN25 | |
| SUMITUBE | W | |
| SUMITUBE | O2C | |
| | W3C | |
| SUMITUBE | O2B2 | |
| | W3F2 | |
| | W3B2 | |
| | W3B2 (4X) | |
| | SA2 | |
| | SA3 | |



SUMITUBE™

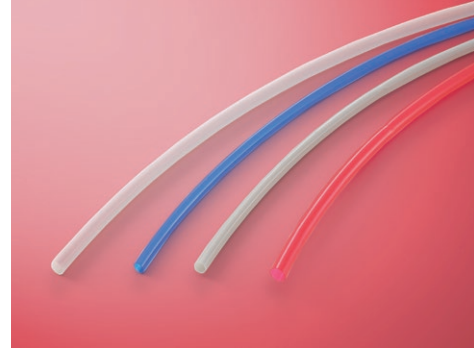
SUMITUBE is a heat-shrinkable tube that takes advantage of the shape-memory effect of plastics enhanced by electron beam irradiation. Made mainly from raw materials such as polyolefin, fluorinated polymer, or thermoplastic elastomer, SUMITUBE is widely used in household appliances, automobiles, aircraft, and other equipment for various purposes, including bundling, thermal protection, and insulation protection of electrical wires and harnesses.

SUMITUBE™ A

[General purpose heat-shrinkable tubing]

Catalog No. 802 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

Basic Properties

- Material : Irradiated cross-linked flexible polyolefin
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: approx. 40%
Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Highly resistant against oil and chemicals
- Transparent colors

Specifications/Approvals

SFP standard (RE4-0180)

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Insulation and protection of resistors and capacitors
- Corrosion protection for pipes

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White, Clear

Properties

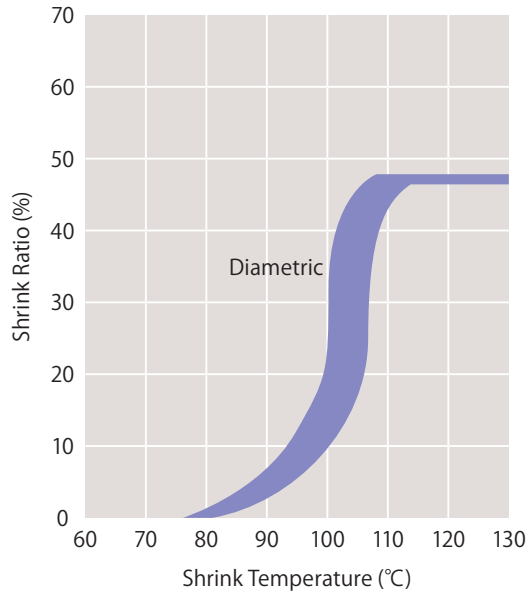
| Properties | Items | Requirements | Typical values*1 |
|------------|----------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 19.2MPa |
| | Elongation | min. 200% | 440% |
| | Specific gravity | — | 0.92 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.6 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.10% | 0.09% |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | |
|-----------------|------------------|-----------------------|------------------------|----------------|------------------------|-------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | Cut | Spool |
| 1.5 × 0.2 | 2.10 ± 0.30 | 0.20 | 0.80 | 0.40 ± 0.10 | 1 | 200 |
| 2 × 0.2 | 2.60 ± 0.30 | 0.20 | 1.30 | 0.40 ± 0.10 | 1 | 200 |
| 2.5 × 0.2 | 3.10 ± 0.30 | 0.20 | 1.50 | 0.40 ± 0.10 | 1 | 200 |
| 3 × 0.2 | 3.60 ± 0.30 | 0.20 | 1.80 | 0.40 ± 0.10 | 1 | 200 |
| 3.5 × 0.2 | 4.10 ± 0.30 | 0.20 | 2.00 | 0.40 ± 0.10 | 1 | 100 |
| 4 × 0.2 | 4.60 ± 0.30 | 0.20 | 2.30 | 0.40 ± 0.10 | 1 | 100 |
| 5 × 0.2 | 5.60 ± 0.30 | 0.20 | 2.90 | 0.40 ± 0.10 | 1 | 100 |
| 6 × 0.25 | 6.5 ± 0.3 | 0.25 | 3.50 | 0.50 ± 0.10 | 1 | 100 |
| 7 × 0.25 | 7.5 ± 0.3 | 0.25 | 4.20 | 0.50 ± 0.10 | 1 | 50 |
| 8 × 0.25 | 8.5 ± 0.3 | 0.25 | 4.70 | 0.50 ± 0.10 | 1 | 50 |
| 9 × 0.25 | 9.5 ± 0.3 | 0.25 | 5.40 | 0.50 ± 0.10 | 1 | 50 |
| 10 × 0.25 | 10.5 ± 0.4 | 0.25 | 6.0 | 0.50 ± 0.10 | 1 | 50 |
| 11 × 0.25 | 11.5 ± 0.4 | 0.25 | 7.0 | 0.50 ± 0.10 | 1 | 50 |
| 12 × 0.3 | 12.4 ± 0.4 | 0.30 | 7.6 | 0.60 ± 0.10 | 1 | 50 |
| 13 × 0.3 | 13.4 ± 0.4 | 0.30 | 8.0 | 0.60 ± 0.10 | 1 | 50 |
| 14 × 0.3 | 14.4 ± 0.4 | 0.30 | 9.0 | 0.60 ± 0.10 | 1 | 50 |
| 15 × 0.3 | 15.4 ± 0.4 | 0.30 | 10.0 | 0.60 ± 0.10 | 1 | 50 |
| 16 × 0.3 | 16.4 ± 0.4 | 0.30 | 10.5 | 0.60 ± 0.10 | 1 | 50 |
| 18 × 0.3 | 18.4 ± 0.4 | 0.30 | 11.5 | 0.60 ± 0.10 | 1 | 50 |
| 20 × 0.3 | 20.4 ± 0.4 | 0.30 | 13.0 | 0.60 ± 0.10 | 1 | 50 |
| 22 × 0.3 | 22.4 ± 0.4 | 0.30 | 14.0 | 0.60 ± 0.10 | 1 | 50 |
| 25 × 0.3 | 25.5 ± 0.5 | 0.30 | 15.0 | 0.60 ± 0.10 | 1 | 50 |

Shrink Properties



SUMITUBE B

| |
|----------|
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

SUMITUBE K

SUMITUBE KH200 (TW)

SUMITUBE KH230 (TW)

SUMITUBE B6

SUMITUBE R

SUMITUBE AN25

SUMITUBE W

SUMITUBE O2C

SUMITUBE W3C

SUMITUBE O2B2

SUMITUBE W3F2

SUMITUBE W3B2

SUMITUBE W3B2 (4X)

SUMITUBE SA2

SUMITUBE SA3

IRRAX™TUBE

IRRAX™TAPE

A

B

F2

F2 (UL)

V2

IRRAXTUBE RP3

B8

ER2

NHR

FE2

IRRAXTAPE VZL

IRRAX™SLEEVE

SCM2

IRRAXSLEEVE SBI 300/350 SNHM

Composite articles

SUMISEAL

SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ C

[General purpose heat-shrinkable tubing
(shrinks at low temperature)]

Catalog No. 812  RoHS directive 10 substances

 Waterproofing  Flame-retarded  UL recognized  CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: approx. 40%
: Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Shrinkage at low temperature (90°C)
- Flexible ■ Transparent colors

Specifications/Approvals

SFP standard (RE4-0580)

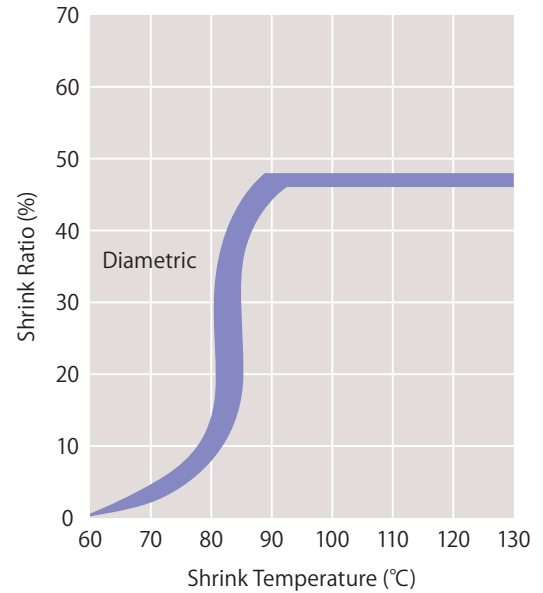
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Fixing and protection of cable markers
- Insulation and protection of resistors and capacitors

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White, Clear

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|----------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 20.9MPa |
| | Elongation | min. 200% | 522% |
| | Specific gravity | — | 0.94 |
| | Hardness (Shore D) | — | 41 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{16} \Omega \cdot \text{cm}$ | $1.2 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.30% | 0.08% |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | |
|-----------------|------------------|-----------------------|------------------------|----------------|------------------------|-------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | Cut | Spool |
| 1 × 0.2 | 1.60 ± 0.30 | 0.20 | 0.60 | 0.40 ± 0.10 | 1 | 100 |
| 1.5 × 0.2 | 2.10 ± 0.30 | 0.20 | 0.80 | 0.40 ± 0.10 | 1 | 200 |
| 2 × 0.2 | 2.60 ± 0.30 | 0.20 | 1.30 | 0.40 ± 0.10 | 1 | 200 |
| 2.5 × 0.2 | 3.10 ± 0.30 | 0.20 | 1.50 | 0.40 ± 0.10 | 1 | 200 |
| 3 × 0.2 | 3.60 ± 0.30 | 0.20 | 1.80 | 0.40 ± 0.10 | 1 | 200 |
| 3.5 × 0.2 | 4.10 ± 0.30 | 0.20 | 2.00 | 0.40 ± 0.10 | 1 | 100 |
| 4 × 0.2 | 4.60 ± 0.30 | 0.20 | 2.30 | 0.40 ± 0.10 | 1 | 100 |
| 5 × 0.2 | 5.60 ± 0.30 | 0.20 | 2.90 | 0.40 ± 0.10 | 1 | 100 |
| 6 × 0.25 | 6.5 ± 0.3 | 0.25 | 3.50 | 0.50 ± 0.10 | 1 | 100 |
| 7 × 0.25 | 7.5 ± 0.3 | 0.25 | 4.20 | 0.50 ± 0.10 | 1 | 50 |
| 8 × 0.25 | 8.5 ± 0.3 | 0.25 | 4.70 | 0.50 ± 0.10 | 1 | 50 |
| 9 × 0.25 | 9.5 ± 0.3 | 0.25 | 5.40 | 0.50 ± 0.10 | 1 | 50 |
| 10 × 0.25 | 10.5 ± 0.4 | 0.25 | 6.0 | 0.50 ± 0.10 | 1 | 50 |
| 11 × 0.25 | 11.5 ± 0.4 | 0.25 | 7.0 | 0.50 ± 0.10 | 1 | 50 |
| 12 × 0.3 | 12.4 ± 0.4 | 0.30 | 7.6 | 0.60 ± 0.10 | 1 | 50 |
| 13 × 0.3 | 13.4 ± 0.4 | 0.30 | 8.0 | 0.60 ± 0.10 | 1 | 50 |
| 14 × 0.3 | 14.4 ± 0.4 | 0.30 | 9.0 | 0.60 ± 0.10 | 1 | 50 |
| 15 × 0.3 | 15.4 ± 0.4 | 0.30 | 10.0 | 0.60 ± 0.10 | 1 | 50 |
| 16 × 0.3 | 16.4 ± 0.4 | 0.30 | 10.5 | 0.60 ± 0.10 | 1 | 50 |
| 18 × 0.3 | 18.4 ± 0.4 | 0.30 | 11.5 | 0.60 ± 0.10 | 1 | 50 |
| 20 × 0.3 | 20.4 ± 0.4 | 0.30 | 13.0 | 0.60 ± 0.10 | 1 | 50 |
| 22 × 0.3 | 22.4 ± 0.4 | 0.30 | 14.0 | 0.60 ± 0.10 | 1 | 50 |
| 25 × 0.3 | 25.5 ± 0.5 | 0.30 | 15.0 | 0.60 ± 0.10 | 1 | 50 |

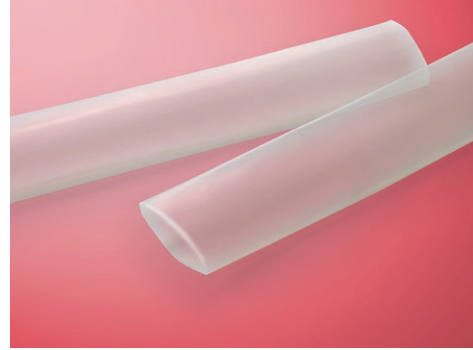
| | |
|----------------------------|-------------|
| SUMITUBE | B |
| SUMITUBE | LB |
| | F (Z) |
| | F3 (Z) |
| SUMITUBE | NHR2 |
| SUMITUBE | NHR4 |
| | V (300V) |
| | V (600V) |
| | F2 (Z) |
| | F4 (Z) |
| SUMITUBE | B2 |
| | B2 (3X) |
| | B8 |
| SUMITUBE | K |
| | K2 |
| SUMITUBE | KH200 (TW) |
| SUMITUBE | KH230 (TW) |
| | B6 |
| SUMITUBE | R |
| | AN25 |
| SUMITUBE | W |
| | O2C |
| SUMITUBE | W3C |
| | O2B2 |
| | W3F2 |
| SUMITUBE | W3B2 |
| | W3B2 (4X) |
| | SA2 |
| | SA3 |
| IRRX™TUBE | A |
| IRRX™TAPE | B |
| | F2 |
| | F2 (UL) |
| IRRX™TUBE | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRX™TAPE | VZL |
| IRRX™SLEEVE | SCM2 |
| IRRX™SLEEVE | SBI 300/350 |
| | SNHM |
| Composite articles | |
| SUMISEAL | |
| SUMITUBE SA3 CAP | |
| Processing equipment | |
| SUMISHRINKER / HEATING GUN | |

SUMITUBE™ A4

[Weather resistant heat-shrinkable tubing]

Catalog No. 858 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

Basic Properties

- Material : Irradiated cross-linked flexible polyolefin
- Shrink temperature : min. 110°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Highly weather resistant
- Opaque and bright colors

Specifications/Approvals

SFP standard (RE4-3684)

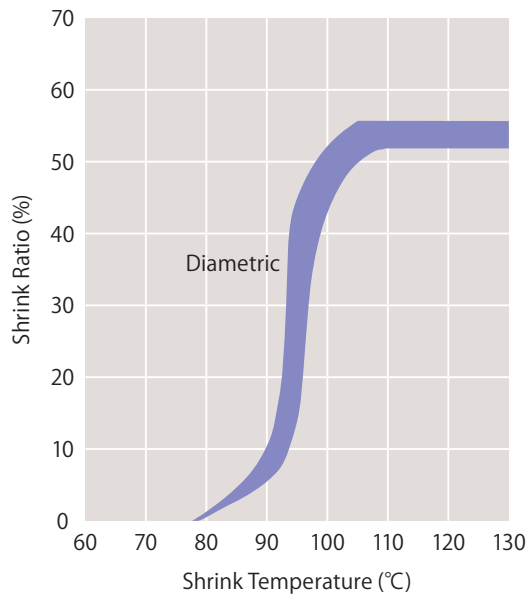
Applications

- Insulation and protection for outdoor applications
- Insulation and protection for antennas
- Insulation and reinforcement for cable terminals
- Color identification and bundling for electric wires
- Corrosion protection for pipes

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White, Clear

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 20.9MPa |
| | Elongation | min. 200% | 455% |
| | Specific gravity | — | 0.92 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.6 \times 10^{17} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.20% | 0.10% |
| | Flammability | Flammable | — |
| | Weather resistance | — | Colors can be identified for 2 years |
| | Outdoor exposure test*2 | — | Elongation 100% of original value after 1,000 hours |
| | Weatherometer | — | Elongation 77% of original value after 2,000 hours |

*1: For reference use only *2: Performance may vary depending on region or conditions

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 3/64 | 1.60 ± 0.30 | 0.20 | 0.60 | 0.33 | 305 |
| 1/16 | 2.00 ± 0.30 | 0.20 | 0.80 | 0.36 | 305 |
| 3/32 | 2.70 ± 0.30 | 0.25 | 1.20 | 0.44 | 152.5 |
| 1/8 | 3.50 ± 0.30 | 0.25 | 1.60 | 0.44 | 152.5 |
| 3/16 | 5.20 ± 0.40 | 0.25 | 2.40 | 0.44 | 61 |
| 1/4 | 6.8 ± 0.4 | 0.30 | 3.20 | 0.56 | 61 |
| 3/8 | 10.0 ± 0.4 | 0.30 | 4.80 | 0.56 | 61 |
| 1/2 | 13.2 ± 0.5 | 0.30 | 6.4 | 0.56 | 61 |
| 3/4 | 20.0 ± 0.6 | 0.35 | 9.5 | 0.69 | 61 |
| 1 | 26.6 ± 0.8 | 0.40 | 12.7 | 0.77 | 61 |
| 1-1/2 | 39.3 ± 1.0 | 0.45 | 19.1 | 0.87 | 61 |
| 2 | 52.7 ± 1.5 | 0.50 | 25.4 | 0.97 | 61 |

SUMITUBE B

LB

F (Z)

F3 (Z)

SUMITUBE NHR2

NHR4

V (300V)

V (600V)

F2 (Z)

F4 (Z)

SUMITUBE B2

B2 (3X)

B8

SUMITUBE K

K2

SUMITUBE KH200 (TW)

SUMITUBE KH230 (TW)

B6

SUMITUBE R

AN25

SUMITUBE W

O2C

W3C

O2B2

W3F2

SUMITUBE W3B2

W3B2 (4X)

SA2

SA3

IRRAX™TUBE

IRRAX™TAPE

A

B

F2

F2 (UL)

V2

IRRAXTUBE RP3

B8

ER2

NHR

FE2

IRRAXTAPE VZL

IRRAX™SLEEVE

SCM2

IRRAXSLEEVE SBI

300/350

SNHM

Composite articles

SUMISEAL

SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ LA

[Large diameter heat-shrinkable tubing]

Catalog No. 813 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible polyolefin
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: approx. 35%
: Longitudinal change: min. -20%
- Continuous operating temperature : -55 to 105°C

Features

- Large diameter and thick wall

Specifications/Approvals

SFP standard (RE4-2380)

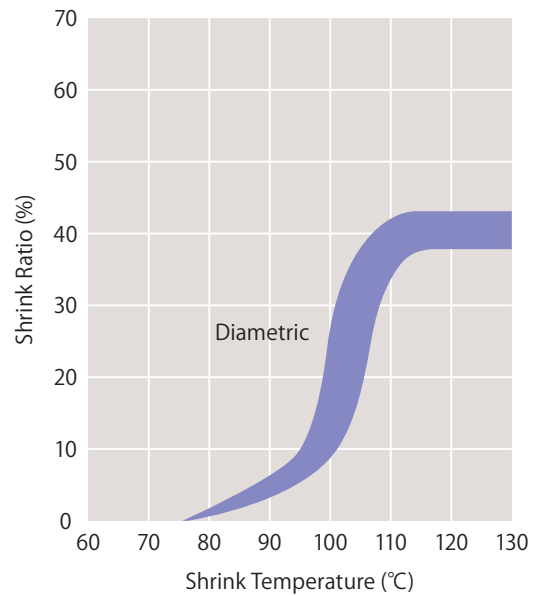
Applications

- Electrical insulation for busbars
- Insulation and protection for metal sleeves

Colors

- Black, Clear

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|----------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 19.2MPa |
| | Elongation | min. 200% | 440% |
| | Specific gravity | — | 0.92 |
| | Hardness (Shore D) | — | 44 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.6 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.10% | 0.09% |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 30×1 | 36.0±4.0 | 0.70 | 21.0 | 1.50 | 25 |
| 40×1 | 47.0±4 | 0.70 | 27.0 | 1.50 | 25 |
| 50×1 | 57.0±4 | 0.70 | 33.0 | 1.50 | 25 |
| 60×1 | 67.0±4 | 0.70 | 40.0 | 1.50 | 25 |
| 70×1 | 77.0±4 | 0.70 | 46.0 | 1.50 | 20 |
| 80×1 | 86.0±4 | 0.70 | 53.0 | 1.50 | 20 |
| 90×1 | 96.0±4 | 0.70 | 60.0 | 1.50 | 20 |
| 100×1 | 106.0±4 | 0.70 | 66.0 | 1.50 | 20 |
| 120×1 | 127.0±4 | 0.70 | 80.0 | 1.50 | 20 |
| 150×1 | 161.0±4 | 0.70 | 98.0 | 1.50 | 20 |

| | |
|----------|------------|
| SUMITUBE | B |
| SUMITUBE | LB |
| | F (Z) |
| | F3 (Z) |
| SUMITUBE | NHR2 |
| | NHR4 |
| | V (300V) |
| | V (600V) |
| | F2 (Z) |
| | F4 (Z) |
| SUMITUBE | B2 |
| | B2 (3X) |
| | B8 |
| SUMITUBE | K |
| | K2 |
| SUMITUBE | KH200 (TW) |
| SUMITUBE | KH230 (TW) |
| | B6 |
| SUMITUBE | R |
| | AN25 |
| SUMITUBE | W |
| | O2C |
| SUMITUBE | W3C |
| | O2B2 |
| | W3F2 |
| | W3B2 |
| SUMITUBE | W3B2 (4X) |
| | SA2 |
| | SA3 |

IRRAX™TUBE IRRAX™TAPE

| | |
|-----------|---------|
| | A |
| | B |
| | F2 |
| | F2 (UL) |
| IRRAXTUBE | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRAXTAPE | VZL |

IRRAX™SLEEVE

| | |
|-------------|-------------|
| | SCM2 |
| IRRAXSLEEVE | SBI 300/350 |
| | SNHM |

Composite articles

| | |
|------------------|--|
| SUMISEAL | |
| SUMITUBE SA3 CAP | |

Processing equipment

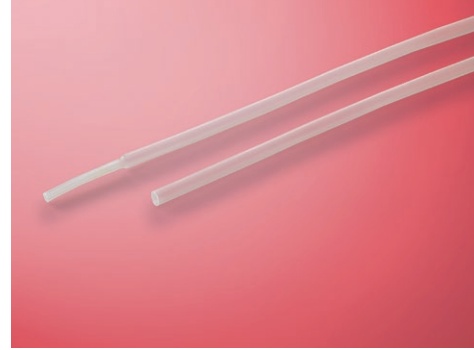
| | |
|----------------------------|--|
| SUMISHRINKER / HEATING GUN | |
|----------------------------|--|

SUMITUBE™ C (UL)

[105°C rating, heat-shrinkable tubing
(shrinks at low temperature)]
UL recognized

Catalog No. 871 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| | |
|----------|--------|
| SUMITUBE | A |
| | C |
| | A4 |
| | LA |
| | C (UL) |
| D | |
| A2 | |

Basic Properties

- Material : Irradiated cross-linked flexible polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: approx. 40%
: Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Shrinkage at low temperature (90°C)
- Thick wall for protecting terminals

Specifications/Approvals

UL224

File No. E75077
Catalog No. 871
Rating temperature: 105°C Rating voltage: 600V

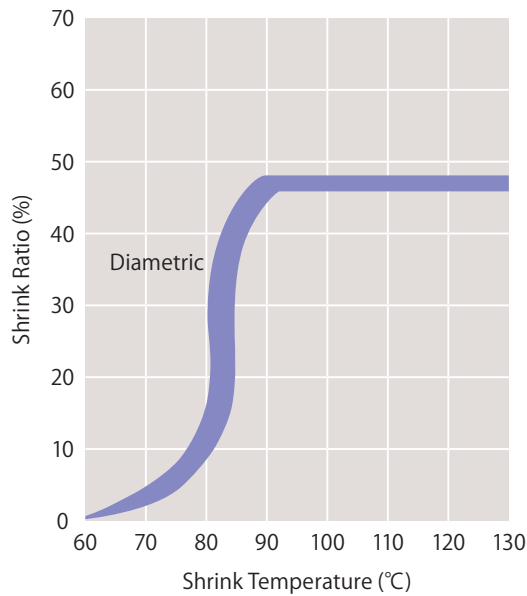
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire (especially for protecting faston terminals)

Colors

- Clear

Shrink Properties



Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 21.0MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 22.0MPa |
| | Elongation (before aging) | min. 200% | 558% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 667% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 25.0kV |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 2.2 x 10 ¹⁶ Ω·cm |
| | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 136°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 475% |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 3.2 × 0.7 | 3.20 | 0.70 | 1.90 | 0.95 | 1 |
| 4.8 × 0.7 | 4.80 | 0.70 | 2.70 | 0.95 | 1 |
| 6 × 0.7 | 6.4 | 0.70 | 3.50 | 0.95 | 1 |
| 7 × 0.7 | 7.0 | 0.70 | 4.50 | 1.20 | 1 |

SUMITUBE

| | |
|----------|----------|
| SUMITUBE | F (Z) |
| | F3 (Z) |
| | NHR2 |
| | NHR4 |
| | V (300V) |
| V (600V) | |

| | |
|----------|---------|
| SUMITUBE | F2 (Z) |
| | F4 (Z) |
| | B2 |
| | B2 (3X) |
| B8 | |

| | |
|----------|----|
| SUMITUBE | K |
| | K2 |

| | |
|----------|------------|
| SUMITUBE | KH200 (TW) |
|----------|------------|

| | |
|----------|------------|
| SUMITUBE | KH230 (TW) |
|----------|------------|

| | |
|----------|------|
| SUMITUBE | B6 |
| | R |
| | AN25 |

| | |
|----------|---|
| SUMITUBE | W |
|----------|---|

| | |
|----------|-----|
| SUMITUBE | O2C |
| | W3C |

| | |
|----------|-----------|
| SUMITUBE | O2B2 |
| | W3F2 |
| | W3B2 |
| | W3B2 (4X) |
| | SA2 |
| | SA3 |

IRRAX™TUBE IRRAX™TAPE

| | |
|-----------|---------|
| IRRAXTUBE | A |
| | B |
| | F2 |
| | F2 (UL) |
| | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRAXTAPE | VZL |

IRRAX™SLEEVE

| | |
|-------------|---------|
| IRRAXSLEEVE | SCM2 |
| | SBI |
| | 300/350 |
| | SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ D

[Semi-rigid heat-shrinkable tubing]

Catalog No. 828 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked semi-rigid polyolefin
- Shrink temperature : min. 140°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 135°C

Features

- Semi-rigid
- High strength against mechanical abuse
- Highly resistant against abrasion
- Highly resistant against oil and chemicals

Specifications/Approvals

SFP standard (RE4-0680)

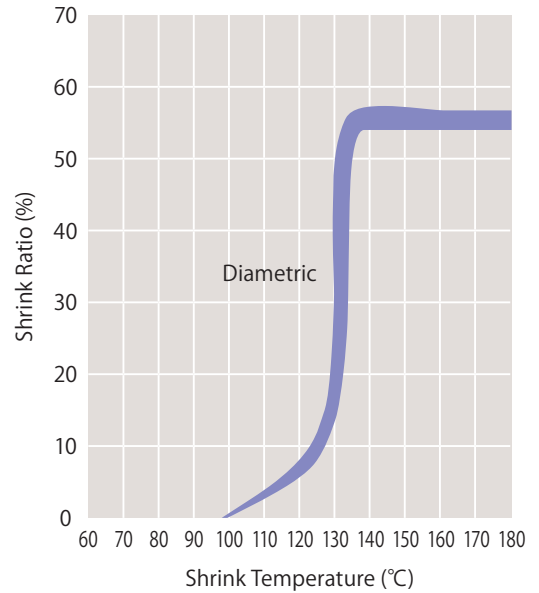
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire which require high strength against mechanical abuse
- Reinforcement by covering
- Mechanical protection for metal wires
- Corrosion protection for pipes

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White, Clear

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|---------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 13.8MPa | 20.0MPa |
| | Elongation (before aging) | min. 200% | 540% |
| | Elongation (after aging) | 175°C x 7 days, min. 100% | 525% |
| | Low temperature flexibility | -55°C x 4 hours, no crack | Pass |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 19.7kV/mm | 55.0kV/mm |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.6 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.20% | 0.10% |
| | Corrosion against bare copper | 150°C x 16 hours, no corrosion | Pass |
| | Transparency stability | 175°C x 24 hours, no change | Pass |
| | Fluid resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 11.1MPa | 22.2MPa |
| | Dielectric strength | min. 15.8kV/mm | 53.5kV/mm |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------|-----------------------|------------------------|----------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 3/64 | 1.60 ± 0.30 | 0.25 | 0.60 | 0.51 ± 0.07 | 1.22 |
| 1/16 | 2.00 ± 0.30 | 0.25 | 0.80 | 0.51 ± 0.07 | 1.22 |
| 3/32 | 2.70 ± 0.30 | 0.25 | 1.20 | 0.51 ± 0.07 | 1.22 |
| 1/8 | 3.50 ± 0.30 | 0.25 | 1.60 | 0.51 ± 0.07 | 1.22 |
| 3/16 | 5.20 ± 0.40 | 0.30 | 2.40 | 0.64 ± 0.07 | 1.22 |
| 1/4 | 6.8 ± 0.4 | 0.30 | 3.20 | 0.64 ± 0.07 | 1.22 |
| 3/8 | 10.0 ± 0.4 | 0.35 | 4.80 | 0.76 ± 0.12 | 1.22 |
| 1/2 | 13.2 ± 0.5 | 0.35 | 6.4 | 0.76 ± 0.12 | 1.22 |

| | |
|----------|------------|
| SUMITUBE | B |
| | LB |
| | F (Z) |
| | F3 (Z) |
| SUMITUBE | NHR2 |
| | NHR4 |
| | V (300V) |
| | V (600V) |
| | F2 (Z) |
| | F4 (Z) |
| SUMITUBE | B2 |
| | B2 (3X) |
| | B8 |
| SUMITUBE | K |
| | K2 |
| SUMITUBE | KH200 (TW) |
| SUMITUBE | KH230 (TW) |
| | B6 |
| SUMITUBE | R |
| | AN25 |
| SUMITUBE | W |
| | O2C |
| | W3C |
| | O2B2 |
| | W3F2 |
| SUMITUBE | W3B2 |
| | W3B2 (4X) |
| | SA2 |
| | SA3 |

| | |
|------------|---------|
| IRRAX™TUBE | A |
| | B |
| | F2 |
| | F2 (UL) |
| IRRAXTUBE | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRAXTAPE | VZL |

| | |
|--------------|-------------|
| IRRAX™SLEEVE | SCM2 |
| IRRAXSLEEVE | SBI 300/350 |
| | SNHM |

| | |
|----------------------|----------------------------|
| Composite articles | SUMISEAL |
| | SUMITUBE SA3 CAP |
| Processing equipment | SUMISHRINKER / HEATING GUN |

SUMITUBE™ A2

[Clear flexible heat-shrinkable tubing]
SAE-AS-23053

Catalog No. 825 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| | |
|----------|--------|
| SUMITUBE | A |
| | C |
| | A4 |
| | LA |
| | C (UL) |
| | D |
| A2 | |

Basic Properties

- Material : Irradiated cross-linked flexible polyolefin
- Shrink temperature : min. 110°C
- Shrink ratio : Radial change: min. 50%
: Longitudinal change: 0 ± 5%
- Continuous operating temperature : -55 to 135°C

Features

- SAE-AS23053 approved
- Transparent colors
- Flexible

Specifications/Approvals

SAE-AS23053/5 Class 2

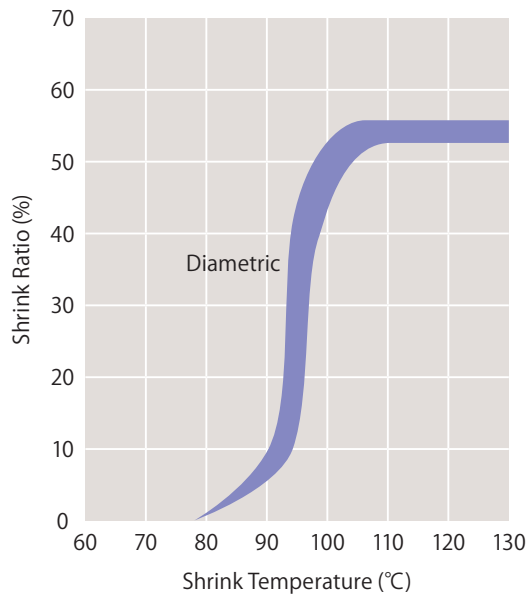
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Fixing and protection of cable markers

Colors

- Clear

Shrink Properties



Properties [SAE-AS23053/5 Class 2]

| Properties | Items | Requirements | Typical values*1 |
|------------|---------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 20.4MPa |
| | Elongation (before aging) | min. 200% | 520% |
| | Elongation (after aging) | 175°C x 7 days, min. 100% | 425% |
| | Low temperature flexibility | -55°C x 4 hours, no crack | Pass |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 19.7kV/mm | 38.8kV/mm |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $5.2 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.50% | 0.10% |
| | Corrosion against bare copper | 175°C x 16 hours, no corrosion | Pass |
| | Transparency stability | 175°C x 24 hours, no change | Pass |
| | Fluid resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 6.9MPa | 13.7MPa |
| | Dielectric strength | min. 15.8kV/mm | 41.9kV/mm |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | |
|-------------------|------------------|-----------------------|------------------------|----------------|------------------------|-------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | Cut | Spool |
| 3/64 | 1.60 ± 0.30 | 0.20 | 0.60 | 0.41 ± 0.07 | 1.22 | 305 |
| 1/16 | 2.00 ± 0.30 | 0.20 | 0.80 | 0.43 ± 0.07 | 1.22 | 305 |
| 3/32 | 2.70 ± 0.30 | 0.25 | 1.20 | 0.51 ± 0.07 | 1.22 | 152.5 |
| 1/8 | 3.50 ± 0.30 | 0.25 | 1.60 | 0.51 ± 0.07 | 1.22 | 152.5 |
| 3/16 | 5.20 ± 0.30 | 0.30 | 2.40 | 0.51 ± 0.07 | 1.22 | 61 |
| 1/4 | 6.8 ± 0.4 | 0.30 | 3.20 | 0.63 ± 0.07 | 1.22 | 61 |
| 3/8 | 10.0 ± 0.4 | 0.30 | 4.75 | 0.63 ± 0.07 | 1.22 | 61 |
| 1/2 | 13.2 ± 0.5 | 0.30 | 6.4 | 0.63 ± 0.07 | 1.22 | 61 |
| 3/4 | 20.0 ± 0.6 | 0.40 | 9.5 | 0.77 ± 0.07 | 1.22 | 61 |
| 1 | 26.6 ± 0.8 | 0.45 | 12.7 | 0.88 ± 0.12 | 1.22 | 61 |
| 1-1/2 | 39.3 ± 1.0 | 0.45 | 19.1 | 1.02 ± 0.15 | 1.22 | 61 |
| 2 | 52.7 ± 1.5 | 0.50 | 25.4 | 1.13 ± 0.17 | 1.22 | 61 |
| 3 | 77.7 ± 1.5 | 0.55 | 38.1 | 1.30 ± 0.20 | 1.22 | 61 |
| 4 | 106.0 ± 3.0 | 0.60 | 50.8 | 1.40 ± 0.22 | 1.22 | 30.5 |

SUMITUBE

| | |
|----------|--------|
| SUMITUBE | B |
| | LB |
| | F (Z) |
| | F3 (Z) |
| | NHR2 |
| | NHR4 |
| V (300V) | |
| V (600V) | |

| | |
|----------|---------|
| SUMITUBE | F2 (Z) |
| | F4 (Z) |
| | B2 |
| | B2 (3X) |
| | B8 |

| | |
|----------|----|
| SUMITUBE | K |
| | K2 |

| | |
|----------|------------|
| SUMITUBE | KH200 (TW) |
|----------|------------|

| | |
|----------|------------|
| SUMITUBE | KH230 (TW) |
|----------|------------|

| | |
|----------|------|
| SUMITUBE | B6 |
| | R |
| | AN25 |

SUMITUBE W

| | |
|----------|-----|
| SUMITUBE | O2C |
| | W3C |

| | |
|----------|-----------|
| SUMITUBE | O2B2 |
| | W3F2 |
| | W3B2 |
| | W3B2 (4X) |
| | SA2 |
| | SA3 |

IRRAX™TUBE IRRAX™TAPE

| | |
|-----------|---------------|
| IRRAXTUBE | A |
| | B |
| | F2 |
| | F2 (UL) |
| | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| | IRRAXTAPE VZL |

IRRAX™SLEEVE

| | |
|-------------|-------------|
| IRRAXSLEEVE | SCM2 |
| | SBI 300/350 |
| | SNHM |

Composite articles

| | |
|----------|------------------|
| SUMISEAL | SUMITUBE SA3 CAP |
|----------|------------------|

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ B

[General purpose flame-retarded heat-shrinkable tubing]

Catalog No. 815  RoHS directive 10 substances

 Waterproofing  Flame-retarded  UL recognized  CSA recognized



| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----------|
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
| KH230 (TW) |

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE
IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

Basic Properties

- **Material** : Irradiated cross-linked flexible flame-retarded polyolefin
- **Shrink temperature** : min. 115°C
- **Shrink ratio** : Radial change: approx. 40%
: Longitudinal change: min. -15%
- **Continuous operating temperature** : -45 to 120°C

Features

- **Flame-retarded (PBDE/PBB-free)**

Specifications/Approvals

SFP standard (RE4-0380)

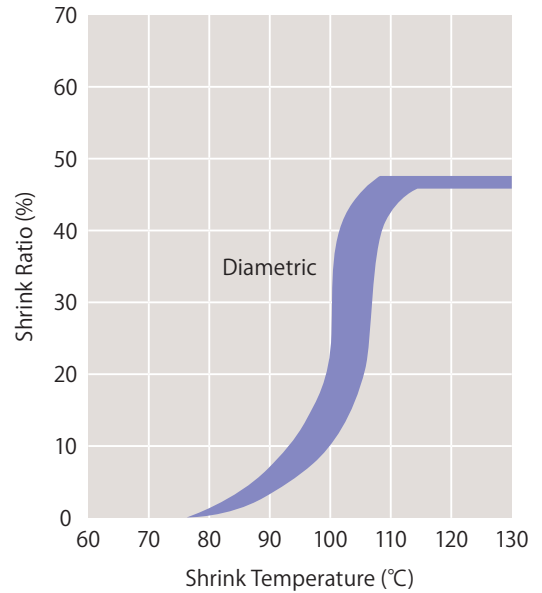
Applications

- Insulation and protection for automobile parts and harnesses
- Insulation, protection and reinforcement for termination and joints of electric wire
- Corrosion protection for pipes

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, White (all colors are in pastel tone)

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|----------------------|------------------------------------|-----------------------------|
| Mechanical | Tensile strength | min. 10.4MPa | 18.6MPa |
| | Elongation | min. 200% | 454% |
| | Specific gravity | — | 1.03 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 1.1 x 10 ¹⁷ Ω·cm |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.30% | 0.15% |
| | Flammability | Flame-retarded (by FMVSS method*2) | Pass |

*1: For reference use only *2: FMVSS = Federal Motor Vehicle Safety Standard (regulation in the U.S.A)

Sizes

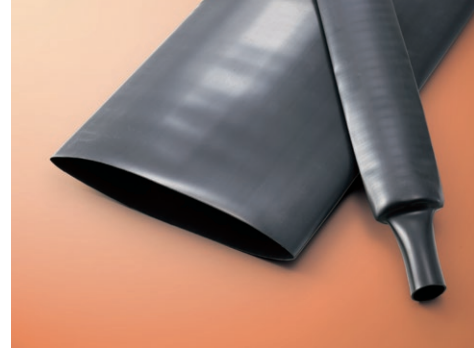
| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | |
|-----------------|------------------|-----------------------|------------------------|-----------------------|------------------------|-------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | Cut | Spool |
| 2 × 0.3 | 2.40 ± 0.30 | 0.30 | 1.20 | 0.40 | 1 | 200 |
| 2.5 × 0.3 | 2.90 ± 0.30 | 0.30 | 1.50 | 0.50 | 1 | 200 |
| 3 × 0.3 | 3.40 ± 0.30 | 0.30 | 1.80 | 0.50 | 1 | 200 |
| 3.5 × 0.3 | 3.90 ± 0.30 | 0.30 | 2.00 | 0.50 | 1 | 100 |
| 4 × 0.3 | 4.40 ± 0.30 | 0.30 | 2.30 | 0.50 | 1 | 100 |
| 5 × 0.3 | 5.40 ± 0.30 | 0.30 | 2.90 | 0.50 | 1 | 100 |
| 6 × 0.3 | 6.4 ± 0.3 | 0.30 | 3.50 | 0.50 | 1 | 50 |
| 7 × 0.3 | 7.4 ± 0.3 | 0.30 | 4.20 | 0.50 | 1 | 50 |
| 8 × 0.3 | 8.4 ± 0.3 | 0.30 | 4.70 | 0.50 | 1 | 50 |
| 10 × 0.3 | 10.6 ± 0.4 | 0.30 | 6.0 | 0.50 | 1 | 50 |
| 11 × 0.4 | 11.6 ± 0.4 | 0.40 | 7.0 | 0.65 | 1 | 50 |
| 12 × 0.4 | 12.6 ± 0.4 | 0.40 | 8.0 | 0.65 | 1 | 50 |
| 13 × 0.4 | 13.6 ± 0.4 | 0.40 | 8.5 | 0.65 | 1 | 50 |
| 14 × 0.4 | 14.6 ± 0.5 | 0.40 | 9.0 | 0.65 | 1 | 50 |
| 15 × 0.4 | 15.6 ± 0.5 | 0.40 | 10.0 | 0.65 | 1 | 50 |
| 16 × 0.4 | 16.6 ± 0.5 | 0.40 | 11.0 | 0.65 | 1 | 50 |
| 18 × 0.4 | 18.6 ± 0.5 | 0.40 | 12.0 | 0.65 | 1 | 50 |
| 20 × 0.4 | 20.5 ± 0.5 | 0.40 | 13.0 | 0.70 | 1 | 50 |
| 22 × 0.4 | 22.5 ± 0.5 | 0.40 | 14.0 | 0.70 | 1 | 50 |
| 25 × 0.4 | 25.5 ± 0.5 | 0.40 | 15.0 | 0.70 | 1 | 50 |

SUMITUBE™ LB

[Large diameter flame-retarded heat-shrinkable tubing]

Catalog No. 813 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

A
C
A4
SUMITUBE LA
C (UL)
D
A2

SUMITUBE B
LB

F (Z)
F3 (Z)
SUMITUBE NHR2
NHR4
V (300V)
V (600V)

F2 (Z)
F4 (Z)
SUMITUBE B2
B2 (3X)
B8

SUMITUBE K
K2

SUMITUBE KH200 (TW)

SUMITUBE KH230 (TW)

B6
SUMITUBE R
AN25

SUMITUBE W

SUMITUBE O2C
W3C

O2B2
W3F2
SUMITUBE W3B2
W3B2 (4X)
SA2
SA3

IRRAX™TUBE
IRRAX™TAPE

A
B
F2
F2 (UL)
V2

IRRAXTUBE RP3
B8
ER2
NHR
FE2

IRRAXTAPE VZL

IRRAX™SLEEVE

SCM2
IRRAXSLEEVE SBI
300/350
SNHM

Composite
articles

SUMISEAL
SUMITUBE SA3 CAP

Processing
equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: approx. 35%
: Longitudinal change: min. -20%
- Continuous operating temperature : -45 to 120°C

Features

- Large diameter and thick wall
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

SFP standard (RE4-2782)

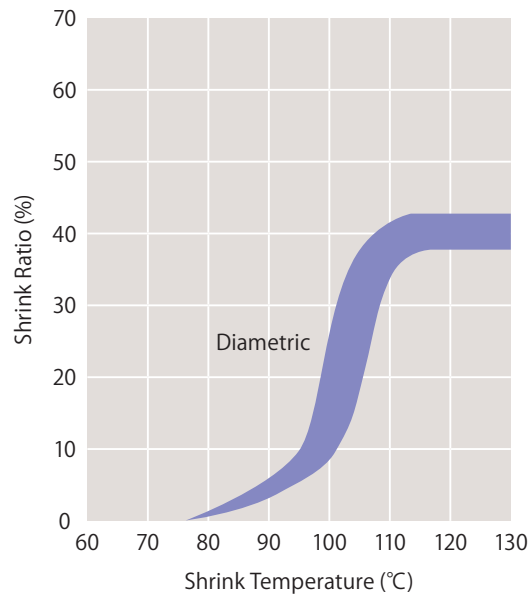
Applications

- Electrical insulation for busbars
- Insulation and protection for metal sleeves

Colors

- Black (Color is in pastel tone)

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|----------------------|------------------------------------|-----------------------------|
| Mechanical | Tensile strength | min. 10.4MPa | 18.6MPa |
| | Elongation | min. 200% | 454% |
| | Specific gravity | — | 1.03 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 1.1 x 10 ¹⁷ Ω·cm |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.30% | 0.15% |
| | Flammability | Flame-retarded (by FMVSS method*2) | Pass |

*1: For reference use only *2: FMVSS = Federal Motor Vehicle Safety Standard (regulation in the U.S.A)

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 30 × 1 | 36.0 ± 4.0 | 0.70 | 21.0 | 1.50 | 25 |
| 40 × 1 | 47 ± 4.0 | 0.70 | 27.0 | 1.50 | 25 |
| 50 × 1 | 57 ± 4.0 | 0.70 | 33.0 | 1.50 | 25 |
| 60 × 1 | 67 ± 4.0 | 0.70 | 40.0 | 1.50 | 25 |
| 70 × 1 | 77 ± 4.0 | 0.70 | 46.0 | 1.50 | 20 |
| 80 × 1 | 86 ± 4.0 | 0.70 | 53.0 | 1.50 | 20 |
| 90 × 1 | 96 ± 4.0 | 0.70 | 60.0 | 1.50 | 20 |
| 100 × 1 | 106 ± 4.0 | 0.70 | 66.0 | 1.50 | 20 |
| 120 × 1 | 127 ± 4.0 | 0.70 | 80.0 | 1.50 | 20 |
| 150 × 1 | 161 ± 4.0 | 0.70 | 98.0 | 1.50 | 20 |

SUMITUBE™ F (Z)

[105°C rating, flame-retarded heat-shrinkable tubing]
UL recognized

Catalog No. 939  RoHS directive 10 substances

 Waterproofing  Flame-retarded  UL recognized  CSA recognized



Basic Properties

- **Material** : Irradiated cross-linked flexible flame-retarded polyolefin
- **Shrink temperature** : min. 90°C
- **Shrink ratio** : Radial change: min. 50%
: Longitudinal change: min. -15%
- **Continuous operating temperature** : -55 to 105°C

Features

- UL recognized  Flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224
File No. E48762 Catalog No. SUMITUBE™ F (Z) or 939
Rating temperature: 105°C Rating voltage: 600V
Flammability: VW-1

Electrical Appliance and Material Safety Law (Japan)
Flammability rating (-F-) test registration No.: F-ST53-009 - F-ST53-012

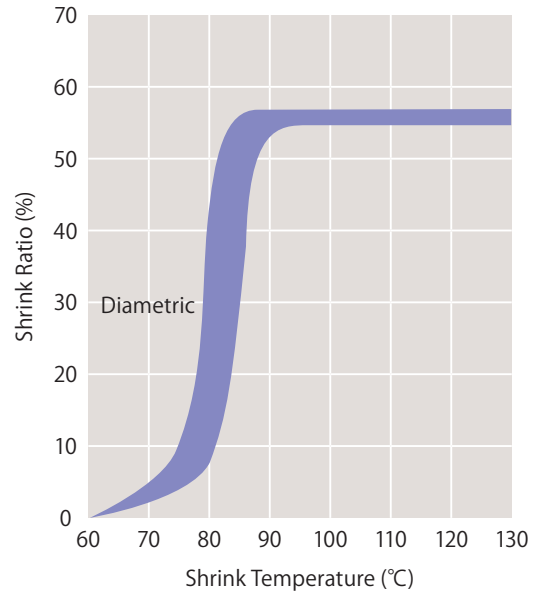
Marking on Surface

VW-1 -F-  SUMITOMO-K SUMITUBE F (Z) CAT 939 105°C

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Insulation and protection of resistors and capacitors

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 12.6MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 14.8MPa |
| | Elongation (before aging) | min. 200% | 333% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 358% |
| | Heat shock | 180°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 21.0kV |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹² Ω·cm | 2.7 x 10 ¹⁶ Ω·cm |
| | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 136°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 358% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (mm) | After supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | | Nominal size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | |
|-----------------|---------------------|-----------------------|------------------------|-----------------------|------------------------|-------|-------------------|------------------|-----------------------|------------------------|-----------------------|------------------------|-------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | Cut | Spool | | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | Cut | Spool |
| 1 × 0.2 | 1.30 ± 0.30 | 0.20 | 0.50 | 0.33 | 1 | 200 | 11 × 0.25 | 11.4 ± 0.4 | 0.25 | 5.50 | 0.56 | 1 | 50 |
| 1.5 × 0.2 | 2.00 ± 0.30 | 0.20 | 0.75 | 0.36 | 1 | 200 | 12 × 0.25 | 12.4 ± 0.4 | 0.25 | 6.0 | 0.56 | 1 | 50 |
| 2 × 0.2 | 2.50 ± 0.30 | 0.20 | 1.00 | 0.44 | 1 | 200 | 13 × 0.3 | 13.4 ± 0.4 | 0.30 | 6.5 | 0.69 | 1 | 50 |
| 2.5 × 0.25 | 3.00 ± 0.30 | 0.25 | 1.25 | 0.44 | 1 | 200 | 14 × 0.3 | 14.5 ± 0.4 | 0.30 | 7.0 | 0.69 | 1 | 50 |
| 3 × 0.25 | 3.50 ± 0.30 | 0.25 | 1.50 | 0.44 | 1 | 200 | 15 × 0.3 | 15.5 ± 0.4 | 0.30 | 7.5 | 0.69 | 1 | 50 |
| 3.5 × 0.25 | 4.00 ± 0.30 | 0.25 | 1.75 | 0.44 | 1 | 200 | 16 × 0.3 | 16.8 ± 0.5 | 0.30 | 8.0 | 0.69 | 1 | 50 |
| 4 × 0.25 | 4.50 ± 0.30 | 0.25 | 2.00 | 0.44 | 1 | 200 | 18 × 0.35 | 18.7 ± 0.5 | 0.35 | 9.0 | 0.77 | 1 | 50 |
| 5 × 0.25 | 5.40 ± 0.30 | 0.25 | 2.50 | 0.56 | 1 | 100 | 20 × 0.35 | 21.2 ± 0.6 | 0.35 | 10.0 | 0.77 | 1 | 50 |
| 6 × 0.25 | 6.4 ± 0.4 | 0.25 | 3.00 | 0.56 | 1 | 100 | 22 × 0.4 | 23.2 ± 0.6 | 0.40 | 11.0 | 0.77 | 1 | 50 |
| 7 × 0.25 | 7.4 ± 0.4 | 0.25 | 3.50 | 0.56 | 1 | 50 | 25 × 0.4 | 26.1 ± 0.8 | 0.40 | 12.5 | 0.87 | 1 | 50 |
| 8 × 0.25 | 8.4 ± 0.4 | 0.25 | 4.00 | 0.56 | 1 | 50 | 30 × 0.5 | 32.0 ± 1.0 | 0.50 | 15.0 | 0.87 | 1 | 50 |
| 9 × 0.25 | 9.4 ± 0.4 | 0.25 | 4.50 | 0.56 | 1 | 50 | 40 × 0.5 | 43.0 ± 1.5 | 0.50 | 20.0 | 0.97 | 1 | 50 |
| 10 × 0.25 | 10.4 ± 0.4 | 0.25 | 5.00 | 0.56 | 1 | 50 | 50 × 0.5 | 53.0 ± 2.0 | 0.50 | 25.0 | 0.97 | 1 | 50 |

SUMITUBE™ F3 (Z)

[Thin wall, very flexible flame-retarded heat-shrinkable tubing] UL recognized

Catalog No. 941 RoHS directive 10 substances



SUMITUBE™

| |
|-------------|
| A |
| C |
| A4 |
| SUMITUBE LA |
| C (UL) |
| D |
| A2 |

| |
|------------|
| SUMITUBE B |
| LB |

| |
|---------------|
| F (Z) |
| F3 (Z) |
| SUMITUBE NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|-------------|
| F2 (Z) |
| F4 (Z) |
| SUMITUBE B2 |
| B2 (3X) |
| B8 |

| |
|------------|
| SUMITUBE K |
| K2 |

| |
|---------------------|
| SUMITUBE KH200 (TW) |
| SUMITUBE KH230 (TW) |

| |
|------------|
| B6 |
| SUMITUBE R |
| AN25 |

| |
|------------|
| SUMITUBE W |
|------------|

| |
|--------------|
| SUMITUBE O2C |
| W3C |

| |
|--------------------|
| O2B2 |
| W3F2 |
| W3B2 |
| SUMITUBE W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------------|
| A |
| B |
| F2 |
| F2 (UL) |
| SUMITUBE V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAXTAPE VZL |

IRRAX™SLEEVE

| |
|-------------------------|
| SCM2 |
| IRRAXSLEEVE SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- UL recognized
- Thin wall, quick shrinkage
- Flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224

File No. E75077 Catalog No. SUMITUBE™ F3 (Z) or 941
Rating temperature: 105°C Rating voltage: 300V
Flammability: VW-1

Electrical Appliance and Material Safety Law (Japan)
Flammability rating (-F-) test registration No.: F-ST53-009 - F-ST53-012

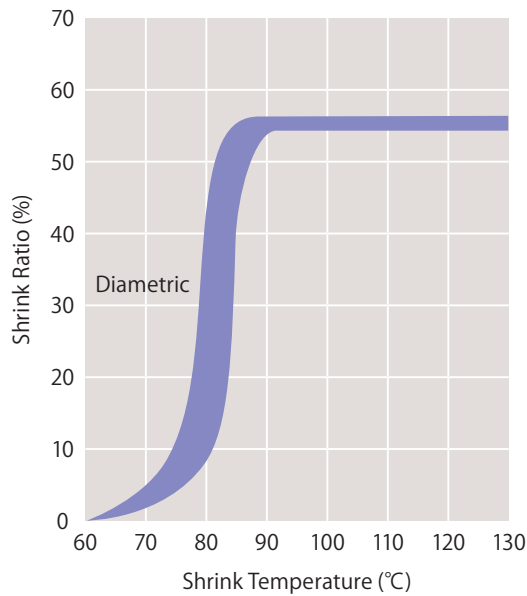
Marking on Surface

VW-1 -F- SUMITOMO-K SUMITUBE F3 (Z) CAT 941 105°C

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Insulation and protection of resistors and capacitors

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 16.0MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 18.7MPa |
| | Elongation (before aging) | min. 200% | 350% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 390% |
| | Heat shock | 180°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 14.8kV |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. $1.0 \times 10^{16} \Omega \cdot \text{cm}$ | $3.9 \times 10^{16} \Omega \cdot \text{cm}$ |
| | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 136°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 335% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

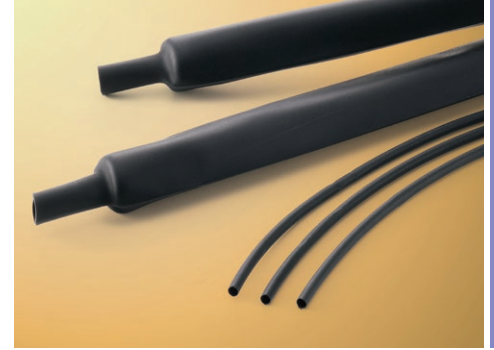
Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1 × 0.1 | 1.30 ± 0.30 | 0.10 | 0.50 | 0.20 | 200 |
| 1.5 × 0.1 | 1.90 ± 0.30 | 0.10 | 0.75 | 0.20 | 200 |
| 2 × 0.1 | 2.30 ± 0.30 | 0.10 | 1.00 | 0.20 | 200 |
| 2.5 × 0.15 | 2.80 ± 0.30 | 0.15 | 1.25 | 0.25 | 200 |
| 3 × 0.15 | 3.30 ± 0.30 | 0.15 | 1.50 | 0.25 | 200 |
| 3.5 × 0.15 | 3.80 ± 0.30 | 0.15 | 1.75 | 0.25 | 200 |
| 4 × 0.15 | 4.40 ± 0.30 | 0.15 | 2.00 | 0.25 | 200 |
| 5 × 0.15 | 5.50 ± 0.30 | 0.15 | 2.50 | 0.25 | 100 |
| 6 × 0.15 | 6.5 ± 0.4 | 0.15 | 3.00 | 0.28 | 100 |
| 7 × 0.15 | 7.5 ± 0.4 | 0.15 | 3.50 | 0.28 | 50 |
| 8 × 0.15 | 8.5 ± 0.4 | 0.15 | 4.00 | 0.28 | 50 |
| 9 × 0.15 | 9.5 ± 0.4 | 0.15 | 4.50 | 0.28 | 50 |
| 10 × 0.15 | 10.5 ± 0.5 | 0.15 | 5.00 | 0.28 | 50 |

SUMITUBE™ NHR2

[125°C rating, halogen-free, flame-retarded, heat-resistant tubing] UL/cULus recognized

Catalog No. 717 RoHS directive 10 substances



Basic Properties

- **Material** : Irradiated cross-linked flexible flame-retarded polyolefin
- **Shrink temperature** : min. 100°C
- **Shrink ratio** : Radial change: min. 50%
: Longitudinal change: -5 ±5%
- **Continuous operating temperature** : -55 to 125°C

Features

- UL recognized Flexible
- Flame-retarded (halogen-based flame-retardant-free)

Specifications/Approvals

UL224
File No. E48762 Rating temperature: 125°C
Rating voltage: 600V Flammability: VW-1

Marking on Surface

125°C VW-1 SUMITUBE NHR2 -F- XXX
(XXX indicates size)

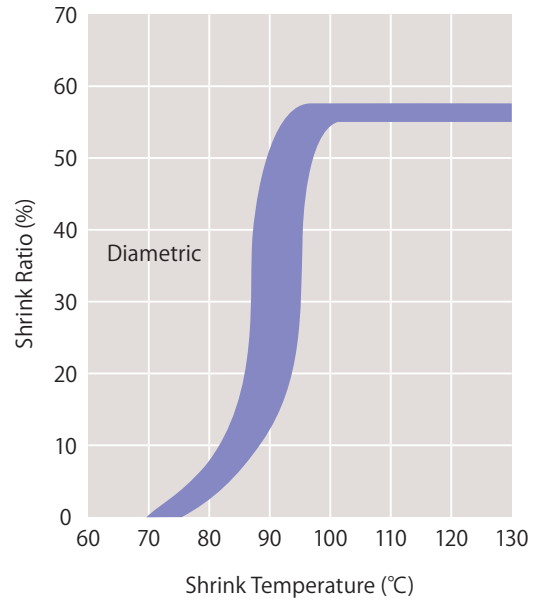
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires

Colors

- Black

Shrink Properties



Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 11.9MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 11.5MPa |
| | Elongation (before aging) | min. 200% | 510% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 460% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 16.0kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 4.0 x 10 ¹⁵ Ω·cm |
| | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | | After recovered (mm) | | | Unit length (min.) (m) | Nominal size (mm) | As supplied (mm) | | | After recovered (mm) | | | Unit length (min.) (m) |
|-----------------|------------------|-----------------------|------------------------|-----------------------|-----------------|-----------------------|------------------------|-------------------|------------------------|-----------------------|-----------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | Inside diameter | Wall thickness (nom.) | | | Inside diameter (max.) | Wall thickness (min.) | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1 × 0.2 | 1.40 ± 0.20 | 0.20 | 0.50 | 0.33 | 200 | 11 × 0.25 | 11.4 ± 0.4 | 0.25 | 5.50 | 0.56 | 50 | | | | |
| 1.5 × 0.2 | 2.00 ± 0.20 | 0.20 | 0.75 | 0.36 | 200 | 12 × 0.25 | 12.4 ± 0.4 | 0.25 | 6.00 | 0.56 | 50 | | | | |
| 2 × 0.2 | 2.50 ± 0.20 | 0.20 | 1.00 | 0.44 | 200 | 13 × 0.3 | 13.4 ± 0.4 | 0.30 | 6.5 | 0.69 | 50 | | | | |
| 2.5 × 0.25 | 3.00 ± 0.20 | 0.25 | 1.25 | 0.44 | 200 | 14 × 0.3 | 14.5 ± 0.4 | 0.30 | 7.0 | 0.69 | 50 | | | | |
| 3 × 0.25 | 3.50 ± 0.30 | 0.25 | 1.50 | 0.44 | 200 | 15 × 0.3 | 15.5 ± 0.5 | 0.30 | 7.5 | 0.69 | 50 | | | | |
| 3.5 × 0.25 | 4.00 ± 0.30 | 0.25 | 1.75 | 0.44 | 200 | 16 × 0.3 | 16.8 ± 0.5 | 0.30 | 8.0 | 0.69 | 50 | | | | |
| 4 × 0.25 | 4.50 ± 0.30 | 0.25 | 2.00 | 0.44 | 200 | 18 × 0.35 | 18.7 ± 0.5 | 0.35 | 9.0 | 0.77 | 50 | | | | |
| 5 × 0.25 | 5.40 ± 0.30 | 0.25 | 2.50 | 0.56 | 100 | 20 × 0.35 | 21.2 ± 0.6 | 0.35 | 10.0 | 0.77 | 50 | | | | |
| 6 × 0.25 | 6.4 ± 0.4 | 0.25 | 3.00 | 0.56 | 100 | 22 × 0.4 | 23.2 ± 0.6 | 0.40 | 11.0 | 0.77 | 50 | | | | |
| 7 × 0.25 | 7.4 ± 0.4 | 0.25 | 3.50 | 0.56 | 50 | 25 × 0.4 | 26.1 ± 0.8 | 0.40 | 12.5 | 0.87 | 50 | | | | |
| 8 × 0.25 | 8.4 ± 0.4 | 0.25 | 4.00 | 0.56 | 50 | 28 × 0.5 | 29.0 ± 1.0 | 0.50 | 14.0 | 0.87 | 50 | | | | |
| 9 × 0.25 | 9.4 ± 0.4 | 0.25 | 4.50 | 0.56 | 50 | 30 × 0.5 | 32.0 ± 1.0 | 0.50 | 15.0 | 0.87 | 50 | | | | |
| 10 × 0.25 | 10.4 ± 0.4 | 0.25 | 5.00 | 0.56 | 50 | | | | | | | | | | |

SUMITUBE™ NHR4

[125°C rating, halogen-free, thin wall, very flexible, flame-retarded, heat-resistant tubing] UL recognized

Catalog No. 718 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| | |
|----------|--------|
| | A |
| | C |
| | A4 |
| SUMITUBE | LA |
| | C (UL) |
| | D |
| | A2 |

| | |
|----------|----|
| SUMITUBE | B |
| | LB |

| | |
|----------|--------|
| | F (Z) |
| | F3 (Z) |
| SUMITUBE | NHR2 |
| | NHR4 |
| V (300V) | |
| V (600V) | |

| | |
|----------|---------|
| | F2 (Z) |
| | F4 (Z) |
| SUMITUBE | B2 |
| | B2 (3X) |
| | B8 |

| | |
|----------|----|
| SUMITUBE | K |
| | K2 |

| | |
|----------|------------|
| SUMITUBE | KH200 (TW) |
| SUMITUBE | KH230 (TW) |

| | |
|----------|------|
| | B6 |
| SUMITUBE | R |
| | AN25 |

| | |
|----------|---|
| SUMITUBE | W |
|----------|---|

| | |
|----------|-----|
| SUMITUBE | O2C |
| | W3C |

| | |
|----------|-----------|
| | O2B2 |
| | W3F2 |
| SUMITUBE | W3B2 |
| | W3B2 (4X) |
| | SA2 |
| | SA3 |

IRRAX™TUBE IRRAX™TAPE

| | |
|-----------|---------|
| | A |
| | B |
| | F2 |
| | F2 (UL) |
| IRRAXTUBE | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRAXTAPE | VZL |

IRRAX™SLEEVE

| | |
|-------------|----------------|
| | SCM2 |
| IRRAXSLEEVE | SBI 300/350 |
| | SNHM |

Composite articles

| | |
|------------------|--|
| SUMISEAL | |
| SUMITUBE SA3 CAP | |

Processing equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 100°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: -5 ±5%
- Continuous operating temperature : -55 to 125°C

Features

- UL recognized
- Flexible
- Flame-retarded (halogen-based flame retardant-free)
- Thin wall, quick shrinkage

Specifications/Approvals

UL224

File No. E75077 Rating temperature: 125°C
Rating voltage: 300V Flammability: VW-1

Marking on Surface

125°C VW-1 SUMITUBE NHR4 -F- XXX
(XXX indicates size)

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires

Colors

- Black

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 11.9MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 11.5MPa |
| | Elongation (before aging) | min. 200% | 510% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 460% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 16.0kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 4.0 x 10 ¹⁵ Ω·cm |
| | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Flammability | Flame-retarded, pass VW-1 | Pass |


*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1 × 0.1 | 1.40 ± 0.20 | 0.10 | 0.50 | 0.20 | 200 |
| 1.5 × 0.1 | 1.90 ± 0.20 | 0.10 | 0.75 | 0.20 | 200 |
| 2 × 0.1 | 2.30 ± 0.20 | 0.10 | 1.00 | 0.20 | 200 |
| 2.5 × 0.15 | 2.90 ± 0.20 | 0.15 | 1.25 | 0.25 | 200 |
| 3 × 0.15 | 3.30 ± 0.30 | 0.15 | 1.50 | 0.25 | 200 |
| 3.5 × 0.15 | 3.80 ± 0.30 | 0.15 | 1.75 | 0.25 | 200 |
| 4 × 0.15 | 4.40 ± 0.30 | 0.15 | 2.00 | 0.25 | 200 |
| 5 × 0.15 | 5.50 ± 0.30 | 0.15 | 2.50 | 0.25 | 100 |
| 6 × 0.15 | 6.5 ± 0.4 | 0.15 | 3.00 | 0.28 | 100 |
| 7 × 0.15 | 7.5 ± 0.4 | 0.15 | 3.50 | 0.28 | 50 |
| 8 × 0.15 | 8.5 ± 0.4 | 0.15 | 4.00 | 0.28 | 50 |
| 9 × 0.15 | 9.5 ± 0.4 | 0.15 | 4.50 | 0.28 | 50 |
| 10 × 0.15 | 10.5 ± 0.5 | 0.15 | 5.00 | 0.28 | 50 |

SUMITUBE™ V (300V)

[Clear, flame-retarded heat-shrinkable tubing]

Catalog No. 836  RoHS directive 10 substances

 Waterproofing  Flame-retarded  UL recognized  CSA recognized



Basic Properties

- Material : Flexible flame-retarded polyvinyl chloride
- Shrink ratio : Radial change: min. 50% Longitudinal change: min. -30%
- Continuous operating temperature : -30 to 105°C

Features

- UL (UL/cULus) recognized
- Flame-retarded
- Transparent colors

Specifications/Approvals

UL224 File No. E48762 Catalog No. 836
 Rating temperature: 105°C Rating voltage: 300V Flammability: VW-1
 Electrical Appliance and Material Safety Law (Japan)
 Flammability rating (-F-) test registration No.: F-ST53-001 to F-ST53-008

Marking on Surface

- ◆ SUMITOMO-K SUMITUBE V 105°C VW-1 CAT 836 -F-

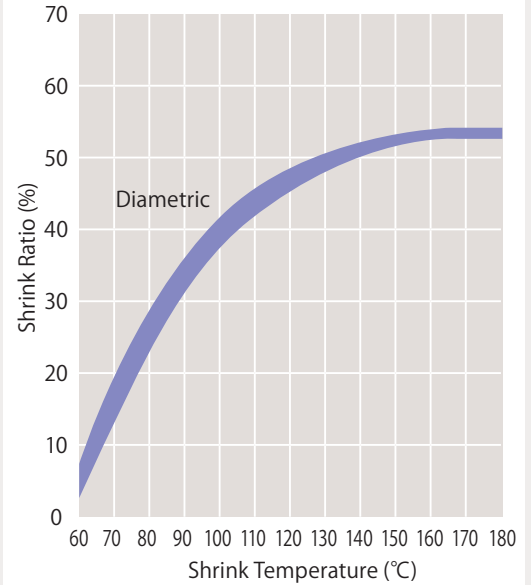
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Fixing and protection of cable markers
- Insulation and protection of resistors and capacitors

Colors

- Clear

Shrink Properties



Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|--------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 27.7MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 29.0MPa |
| | Elongation (before aging) | min. 100% | 340% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 320% |
| | Deformation | 131°C x 1 hour, max. 35% | 27% |
| | Heat shock | 180°C x 4 hours, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 17.5kV |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁰ Ω·cm | 5.3 x 10 ¹² Ω·cm |
| | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 136°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 300% |
| Flammability | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | Inch size (Catalog No. 818) | | | | |
|-------------------|--------------------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
| | Inside diameter (min.) ^{*2} | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 3/64 | 1.20 | 0.10 | 0.60 | 0.26 | 100 |
| 1/16 | 1.60 | 0.10 | 0.80 | 0.33 | 100 |
| 3/32 | 2.40 | 0.12 | 1.20 | 0.33 | 100 |
| 1/8 | 3.20 | 0.12 | 1.60 | 0.33 | 100 |
| 3/16 | 4.80 | 0.12 | 2.40 | 0.33 | 100 |
| 1/4 | 6.4 | 0.15 | 3.20 | 0.44 | 50 |
| 3/8 | 9.5 | 0.15 | 4.80 | 0.44 | 50 |
| 1/2 | 12.7 | 0.19 | 6.4 | 0.56 | 50 |
| 3/4 | 19.1 | 0.23 | 9.5 | 0.69 | 50 |
| 1 | 25.4 | 0.25 | 12.7 | 0.77 | 50 |

| Nominal size (mm) | Metric size (Catalog No. 823) | | | | |
|-------------------|--------------------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
| | Inside diameter (min.) ^{*2} | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1.5 x 0.15 | 1.50 | 0.15 | 0.75 | 0.33 | 100 |
| 2 x 0.15 | 2.00 | 0.15 | 1.00 | 0.33 | 100 |
| 2.5 x 0.15 | 2.50 | 0.15 | 1.25 | 0.33 | 100 |
| 3 x 0.15 | 3.00 | 0.15 | 1.50 | 0.33 | 100 |
| 3.5 x 0.15 | 3.50 | 0.15 | 1.75 | 0.33 | 100 |
| 4 x 0.15 | 4.00 | 0.15 | 2.00 | 0.33 | 100 |
| 5 x 0.15 | 5.00 | 0.15 | 2.50 | 0.44 | 50 |
| 6 x 0.15 | 6.0 | 0.15 | 3.00 | 0.44 | 50 |
| 7 x 0.15 | 7.0 | 0.15 | 3.50 | 0.44 | 50 |
| 8 x 0.15 | 8.0 | 0.15 | 4.00 | 0.44 | 50 |
| 9 x 0.2 | 9.0 | 0.20 | 4.50 | 0.56 | 50 |
| 10 x 0.2 | 10.0 | 0.20 | 5.00 | 0.56 | 50 |
| 11 x 0.2 | 11.0 | 0.20 | 5.50 | 0.56 | 50 |
| 12 x 0.2 | 12.0 | 0.20 | 6.00 | 0.56 | 50 |
| 13 x 0.25 | 13.0 | 0.25 | 6.5 | 0.69 | 50 |
| 14 x 0.25 | 14.0 | 0.25 | 7.0 | 0.69 | 50 |
| 15 x 0.25 | 15.0 | 0.25 | 7.5 | 0.69 | 50 |
| 16 x 0.25 | 16.0 | 0.25 | 8.0 | 0.69 | 50 |
| 18 x 0.25 | 18.0 | 0.25 | 9.0 | 0.77 | 50 |
| 20 x 0.25 | 20.0 | 0.25 | 10.0 | 0.77 | 50 |
| 22 x 0.25 | 22.0 | 0.25 | 11.0 | 0.77 | 50 |
| 25 x 0.25 | 25.0 | 0.25 | 12.5 | 0.77 | 50 |

*2: Actual inside diameter is 20% larger than above

Tube storage conditions and natural shrinkage of tubes

Heat-shrinkable tubes will not shrink prematurely as long as they are stored at a temperature lower than the shrinkage start temperature. However, we recommend that you store them in a cool dark place. Avoid exposing them to direct sunlight.

SUMITUBE V tends to start shrinking at near 40°C due to the characteristics of the raw material, polyvinyl chloride. Store this tube with special care.

- SUMITUBE
 - A
 - C
 - A4
 - LA
 - C (UL)
 - D
 - A2
- SUMITUBE
 - B
 - LB
- SUMITUBE
 - F (Z)
 - F3 (Z)
 - NHR2
 - NHR4
 - V (300V)
 - V (600V)
- SUMITUBE
 - F2 (Z)
 - F4 (Z)
 - B2
 - B2 (3X)
 - B8
- SUMITUBE
 - K
 - K2
- SUMITUBE
 - KH200 (TW)
 - KH230 (TW)
- SUMITUBE
 - B6
 - R
 - AN25
- SUMITUBE
 - W
- SUMITUBE
 - O2C
 - W3C
- SUMITUBE
 - O2B2
 - W3F2
 - W3B2
 - W3B2 (4X)
 - SA2
 - SA3
- IRRAX™TUBE
- IRRAX™TAPE
 - A
 - B
 - F2
 - F2 (UL)
 - V2
 - RP3
 - B8
 - ER2
 - NHR
 - FE2
- IRRAX™SLEEVE
 - SCM2
 - SBI 300/350
 - SNHM
- Composite articles
 - SUMISEAL
 - SUMITUBE SA3 CAP
- Processing equipment
 - SUMISHRINKER / HEATING GUN

SUMITUBE™ V (600V)

[105°C rating, transparent flame-retarded heat-shrinkable tubing] UL/CSA recognized

Catalog No. 835 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
| KH230 (TW) |

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE
IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Flexible flame-retarded polyvinyl chloride
- Shrink ratio : Radial change: min. 50%
Longitudinal change: min. -30%
- Continuous operating temperature : -30 to 105°C

Features

- UL (cULus) recognized
- Flame-retarded
- Transparent

Specifications/Approvals

UL224

File No. E48762 Catalog No. 835 Rating temperature: 105°C
Rating voltage: 600V Flammability: VW-1

CSA C22.2 No. 198.1

File No. LR33298 Rating temperature: 105°C
Rating voltage: 600V Flammability: VW-1

Electrical Appliance and Material Safety Law (Japan)

Flammability rating (-F-) test registration No.: F-STS3-001 to F-STS3-008

Marking on Surface

105°C VW-1 SUMITOMO-K SUMITUBE V CAT 835 CSA 105°C VW-1 -F-

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Fixing and protection for cable markers
- Insulation and protection of resistors and capacitors

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|---|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 27.7MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 29.0MPa |
| | Elongation (before aging) | min. 100% | 340% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 320% |
| | Deformation | 131°C x 1 hour, max. 35% | 27% |
| | Heat shock | 180°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 17.5kV |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁰ Ω·cm | 5.3 x 10 ¹² Ω·cm |
| | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 136°C x 7 days, elongation min. 70% after leaving under 95% humidity, 23°C x 24 hours | 300% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|--------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter*2 (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (nom.) | |
| 3/64 | 1.20 | 0.20 | 0.60 | 0.44 | 100 |
| 1/16 | 1.60 | 0.20 | 0.80 | 0.44 | 100 |
| 3/32 | 2.40 | 0.25 | 1.20 | 0.56 | 100 |
| 1/8 | 3.20 | 0.25 | 1.60 | 0.56 | 100 |
| 3/16 | 4.80 | 0.25 | 2.40 | 0.56 | 100 |
| 1/4 | 6.4 | 0.25 | 3.20 | 0.56 | 50 |
| 3/8 | 9.5 | 0.25 | 4.80 | 0.56 | 50 |
| 1/2 | 12.7 | 0.25 | 6.4 | 0.56 | 50 |
| 3/4 | 19.1 | 0.30 | 9.5 | 0.69 | 50 |
| 1 | 25.4 | 0.35 | 12.7 | 0.77 | 50 |

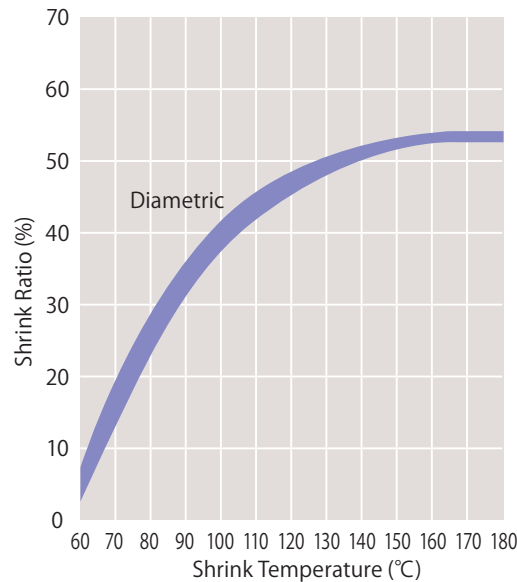
*2: Actual inside diameter is 20% larger than above

Tube storage conditions and natural shrinkage of tubes

Due to the characteristics of its raw material, polyvinyl chloride, SUMITUBE V tends to start shrinking when heated above 40°C. Store this product in a cool dark place away from direct sunlight.

Note: SUMITUBE V may crack if heated locally with high heat. Determine the optimal tube heating conditions while checking how the tube shrinks.

Shrink Properties



Colors

- Clear

SUMITUBE™ F2 (Z)

[125°C rating, flame-retarded heat-shrinkable tubing]
UL/CSA recognized

Catalog No. 940 RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: min. 50%
: Longitudinal change: 0 ±5%
- Continuous operating temperature : -55 to 125°C

Features

- UL/CSA recognized ■ Flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224 File No. E48762 Catalog No. SUMITUBE™ F2 (Z) or 940
Rating temperature: 125°C Rating voltage: 600V Flammability: VW-1
CSA C22.2 No. 198.1 File No. LR33298 Rating temperature: 125°C
Rating voltage: 600V Flammability: VW-1
Electrical Appliance and Material Safety Law (Japan)
Upper operating temperature test 125°C temporary registration No. @004CC0546
Flammability rating (-F-) test registration No.: F-ST53-009 to F-ST53-012

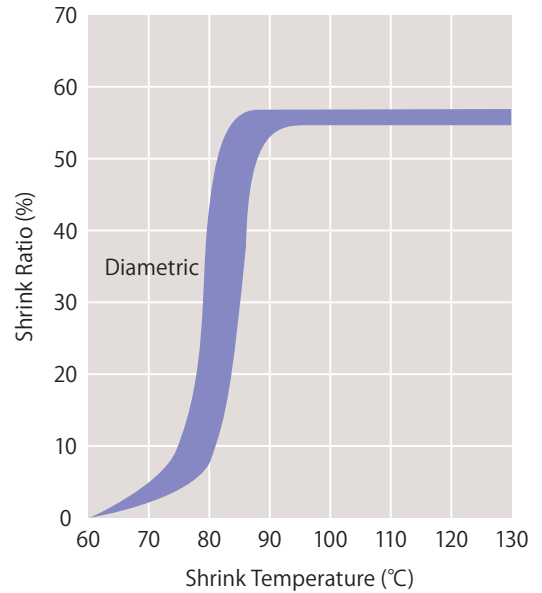
Marking on Surface

125°C VW-1 SUMITOMO-K SUMITUBE F2 (Z) CAT 940 CSA 125°C VW-1 -F-

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Insulation and protection of resistors and capacitors

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 13.2MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 13.4MPa |
| | Elongation (before aging) | min. 200% | 325% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 350% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 19.1kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁶ Ω·cm | 1.6 x 10 ¹⁶ Ω·cm |
| | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 325% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | | After recovered (mm) | | Unit length (min.) (m) | | Nominal size (mm) | As supplied (mm) | | | After recovered (mm) | | Unit length (min.) (m) | |
|-----------------|------------------|-----------------------|------------------------|-----------------------|-----|------------------------|-----------------|-------------------|-----------------------|------------------------|-----------------------|----------------------|-------|------------------------|--|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | Cut | Spool | Inside diameter | | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | Cut | Spool | | |
| 1 × 0.2 | 1.30 ± 0.30 | 0.20 | 0.50 | 0.33 | 1 | 200 | 11 × 0.25 | 11.4 ± 0.4 | 0.25 | 5.50 | 0.56 | 1 | 50 | | |
| 1.5 × 0.2 | 2.00 ± 0.30 | 0.20 | 0.75 | 0.36 | 1 | 200 | 12 × 0.25 | 12.4 ± 0.4 | 0.25 | 6.0 | 0.56 | 1 | 50 | | |
| 2 × 0.2 | 2.50 ± 0.30 | 0.20 | 1.00 | 0.44 | 1 | 200 | 13 × 0.3 | 13.4 ± 0.4 | 0.30 | 6.5 | 0.69 | 1 | 50 | | |
| 2.5 × 0.25 | 3.00 ± 0.30 | 0.25 | 1.25 | 0.44 | 1 | 200 | 14 × 0.3 | 14.5 ± 0.4 | 0.30 | 7.0 | 0.69 | 1 | 50 | | |
| 3 × 0.25 | 3.50 ± 0.30 | 0.25 | 1.50 | 0.44 | 1 | 200 | 15 × 0.3 | 15.5 ± 0.4 | 0.30 | 7.5 | 0.69 | 1 | 50 | | |
| 3.5 × 0.25 | 4.00 ± 0.30 | 0.25 | 1.75 | 0.44 | 1 | 200 | 16 × 0.3 | 16.8 ± 0.5 | 0.30 | 8.0 | 0.69 | 1 | 50 | | |
| 4 × 0.25 | 4.50 ± 0.30 | 0.25 | 2.00 | 0.44 | 1 | 200 | 18 × 0.35 | 18.7 ± 0.5 | 0.35 | 9.0 | 0.77 | 1 | 50 | | |
| 5 × 0.25 | 5.40 ± 0.30 | 0.25 | 2.50 | 0.56 | 1 | 100 | 20 × 0.35 | 21.2 ± 0.6 | 0.35 | 10.0 | 0.77 | 1 | 50 | | |
| 6 × 0.25 | 6.4 ± 0.4 | 0.25 | 3.00 | 0.56 | 1 | 100 | 22 × 0.4 | 23.2 ± 0.6 | 0.40 | 11.0 | 0.77 | 1 | 50 | | |
| 7 × 0.25 | 7.4 ± 0.4 | 0.25 | 3.50 | 0.56 | 1 | 50 | 25 × 0.4 | 26.1 ± 0.8 | 0.40 | 12.5 | 0.87 | 1 | 50 | | |
| 8 × 0.25 | 8.4 ± 0.4 | 0.25 | 4.00 | 0.56 | 1 | 50 | 30 × 0.5 | 32.0 ± 1.0 | 0.50 | 15.0 | 0.87 | 1 | 50 | | |
| 9 × 0.25 | 9.4 ± 0.4 | 0.25 | 4.50 | 0.56 | 1 | 50 | 40 × 0.5 | 43.0 ± 1.5 | 0.50 | 20.0 | 0.97 | 1 | 50 | | |
| 10 × 0.25 | 10.4 ± 0.4 | 0.25 | 5.00 | 0.56 | 1 | 50 | 50 × 0.5 | 53.0 ± 2.0 | 0.50 | 25.0 | 0.97 | 1 | 50 | | |

- SUMITUBE
 - A
 - C
 - A4
 - LA
 - C (UL)
 - D
 - A2
- SUMITUBE
 - B
 - LB
- SUMITUBE
 - F (Z)
 - F3 (Z)
 - NHR2
 - NHR4
 - V (300V)
 - V (600V)
- SUMITUBE
 - F2 (Z)
 - F4 (Z)
 - B2
 - B2 (3X)
 - B8
- SUMITUBE
 - K
 - K2
- SUMITUBE
 - KH200 (TW)
 - KH230 (TW)
- SUMITUBE
 - B6
 - R
 - AN25
- SUMITUBE
 - W
- SUMITUBE
 - O2C
 - W3C
- SUMITUBE
 - O2B2
 - W3F2
 - W3B2
 - W3B2 (4X)
 - SA2
 - SA3
- IRRAX™TUBE IRRAX™TAPE
 - A
 - B
 - F2
 - F2 (UL)
 - V2
 - RP3
 - B8
 - ER2
 - NHR
 - FE2
- IRRAX™SLEEVE
 - SCM2
 - SBI 300/350
 - SNHM
- Composite articles
 - SUMISEAL
 - SUMITUBE SA3 CAP
- Processing equipment
 - SUMISHRINKER / HEATING GUN

SUMITUBE™ F4 (Z)

[125°C rating, flame-retarded heat-shrinkable tubing]
UL/CSA recognized

Catalog No. 942 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: min. 50% Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 125°C

Features

- UL/CSA recognized
- Thin wall, quick shrinkage
- Flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224 File No. E75077 Catalog No. SUMITUBE™ F4 (Z) or 942
Rating temperature: 125°C Rating voltage: 300V Flammability: VW-1
CSA C22.2 No. 198.1 File No. LR33298
Rating temperature: 125°C Rating voltage: 150V Flammability: VW-1
Electrical Appliance and Material Safety Law (Japan)
Flammability rating (-F-) test registration No.: F-ST53-009 to F-ST53-012

Marking on Surface

125°C VW-1 SUMITOMO-K SUMITUBE F4 (Z) CAT 942 CSA 125°C VW-1 -F-

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Insulation and protection of resistors and capacitors

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 15.2MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 16.0MPa |
| | Elongation (before aging) | min. 200% | 350% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 350% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 12.6kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 2.5 x 10 ¹⁶ Ω·cm |
| Chemical | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 342% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

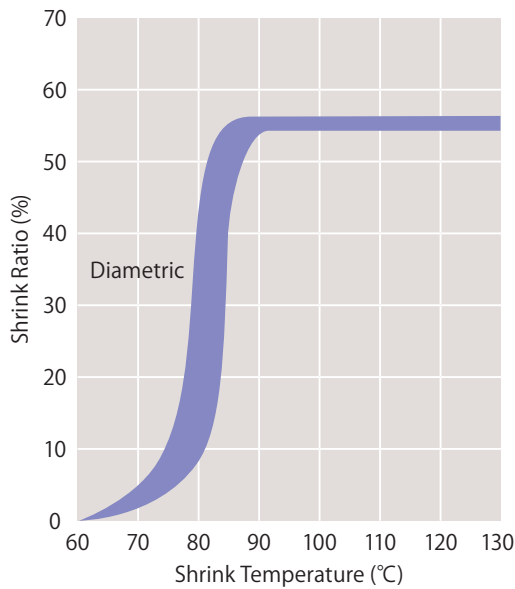
*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1 × 0.1 | 1.30 ± 0.30 | 0.10 | 0.50 | 0.20 | 200 |
| 1.5 × 0.1 | 1.90 ± 0.30 | 0.10 | 0.75 | 0.20 | 200 |
| 2 × 0.1 | 2.30 ± 0.30 | 0.10 | 1.00 | 0.20 | 200 |
| 2.5 × 0.15 | 2.80 ± 0.30 | 0.15 | 1.25 | 0.25 | 200 |
| 3 × 0.15 | 3.30 ± 0.30 | 0.15 | 1.50 | 0.25 | 200 |
| 3.5 × 0.15 | 3.80 ± 0.30 | 0.15 | 1.75 | 0.25 | 200 |
| 4 × 0.15 | 4.40 ± 0.30 | 0.15 | 2.00 | 0.25 | 200 |
| 5 × 0.15 | 5.50 ± 0.30 | 0.15 | 2.50 | 0.25 | 100 |
| 6 × 0.15 | 6.5 ± 0.4 | 0.15 | 3.00 | 0.28 | 100 |
| 7 × 0.15 | 7.5 ± 0.4 | 0.15 | 3.50 | 0.28 | 50 |
| 8 × 0.15 | 8.5 ± 0.4 | 0.15 | 4.00 | 0.28 | 50 |
| 9 × 0.15 | 9.5 ± 0.4 | 0.15 | 4.50 | 0.28 | 50 |
| 10 × 0.15 | 10.5 ± 0.4 | 0.15 | 5.00 | 0.28 | 50 |

| Nominal size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|---------------------|------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1/2 | 13.2 ± 0.5 | 0.15 | 6.4 | 0.28 | 61 |
| 3/4 | 20.6 ± 0.6 | 0.18 | 9.5 | 0.35 | 61 |
| 1 | 26.6 ± 0.8 | 0.20 | 12.7 | 0.40 | 61 |

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

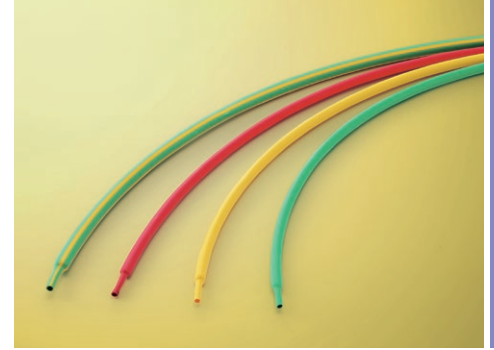
SUMISHRINKER / HEATING GUN

SUMITUBE™ B2

[Flexible flame-retarded heat-shrinkable tubing]
SAE/UL/CSA recognized

Catalog No. 826 RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: min. 50%
: Longitudinal change: 0 ±5%
- Continuous operating temperature : -55 to 135°C

Features

- SAE/UL/CSA recognized
- Flame-retarded (PBDE/PBB-free)
- Flexible ■ Bright colors

Specifications/Approvals

SAE-AS23053/5 Class 1, 3
UL224 File No. E48762 Catalog No. SUMITUBE™ B2 or 826
Rating temperature: 125°C Rating voltage: 600V Flammability: VW-1
CSA C22.2 No. 198.1 File No. LR33298
Rating temperature: 125°C Rating voltage: 600V Flammability: VW-1

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Color identification and bundling for electric wires
- Insulation and protection of resistors and capacitors

Properties [SAE-AS23053/5 Class 1]

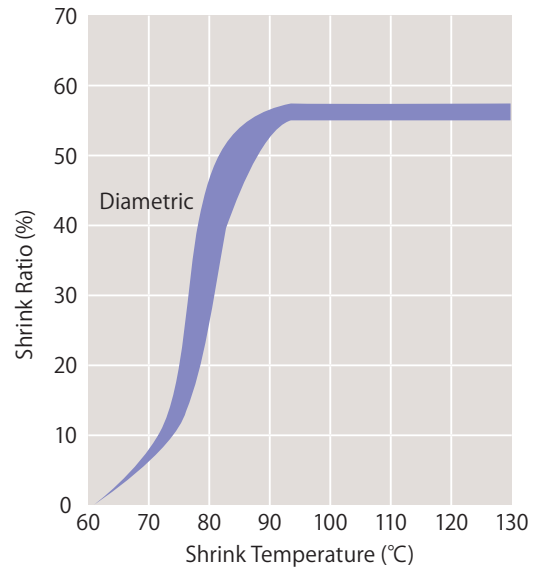
| Properties | Items | Requirements | Typical values*1 |
|------------|---------------------------------|---|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 13.4MPa |
| | Elongation (before aging) | min. 200% | 410% |
| | Elongation (after aging) | 175°C x 7 days, min. 100% | 410% |
| | Low temperature flexibility | -55°C x 4 hours, no crack | Pass |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 19.7kV/mm | 37.1kV/mm |
| | Volume resistivity | min. 1.0 x 10 ¹⁵ Ω·cm | 3.1 x 10 ¹⁵ Ω·cm |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.50% | 0.28% |
| | Corrosion against bare copper | 175°C x 16 hours, no corrosion | Pass |
| | Color stability | 175°C x 24 hours, no change | Pass |
| | Fluid resistance | After im mersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 6.9MPa | 13.1MPa |
| | Dielectric strength | min. 15.8kV/mm | 30.5kV/mm |
| | Flammability(UL224) | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | |
|-------------------|------------------|-----------------------|------------------------|----------------|------------------------|-------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | Cut | Spool |
| 3/64 | 1.60 ±0.30 | 0.20 | 0.60 | 0.41 ±0.07 | 1.22 | 305 |
| 1/16 | 2.00 ±0.30 | 0.20 | 0.80 | 0.43 ±0.07 | 1.22 | 305 |
| 3/32 | 2.70 ±0.30 | 0.25 | 1.20 | 0.51 ±0.07 | 1.22 | 152.5 |
| 1/8 | 3.50 ±0.30 | 0.25 | 1.60 | 0.51 ±0.07 | 1.22 | 152.5 |
| 3/16 | 5.20 ±0.30 | 0.30 | 2.40 | 0.51 ±0.07 | 1.22 | 61 |
| 1/4 | 6.8 ±0.4 | 0.30 | 3.20 | 0.64 ±0.07 | 1.22 | 61 |
| 3/8 | 10.0 ±0.4 | 0.30 | 4.75 | 0.64 ±0.07 | 1.22 | 61 |
| 1/2 | 13.2 ±0.5 | 0.30 | 6.4 | 0.64 ±0.07 | 1.22 | 61 |
| 3/4 | 20.0 ±0.6 | 0.40 | 9.5 | 0.76 ±0.07 | 1.22 | 61 |
| 1 | 26.6 ±0.8 | 0.45 | 12.7 | 0.89 ±0.12 | 1.22 | 61 |
| 1-1/2 | 39.3 ±1.0 | 0.45 | 19.1 | 1.02 ±0.15 | 1.22 | 61 |
| 2 | 52.7 ±1.5 | 0.50 | 25.4 | 1.14 ±0.17 | 1.22 | 61 |
| 3 | 77.7 ±1.5 | 0.55 | 38.1 | 1.27 ±0.20 | 1.22 | 61 |
| 4 | 106.0 ±3.0 | 0.60 | 50.8 | 1.40 ±0.22 | 1.22 | 30.5 |

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White
- Note: Yellow/Green striped color is available only for limited sizes
Yellow/Green has no SAE recognized

IRRAX™TUBE IRRAX™TAPE

- A
- B
- F2
- F2 (UL)
- V2
- RP3
- B8
- ER2
- NHR
- FE2
- IRRAXTAPE VZL

IRRAX™SLEEVE

- SCM2
- IRRAXSLEEVE SBI 300/350
- SNHM

Composite articles

- SUMISEAL
- SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ B2 (3X)

[High shrink ratio flame-retarded heat-shrinkable tubing] UL/CSA recognized

Catalog No. 826  RoHS directive 10 substances



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE
IRRAX™TAPE

| |
|-----------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| IRRAXTUBE |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAXTAPE |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| IRRAXSLEEVE |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 90°C
- Shrink ratio : Radial change: min. 66%
Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 135°C

Features

- High shrink ratio
- UL/CSA recognized
- Flame-retarded (PBDE/PBB-free)
- Bright colors

Specifications/Approvals

UL224

File No. E48762 Catalog No. SUMITUBE™ B2 or 826
Rating temperature: 125°C Rating voltage: 600V
Flammability: VW-1

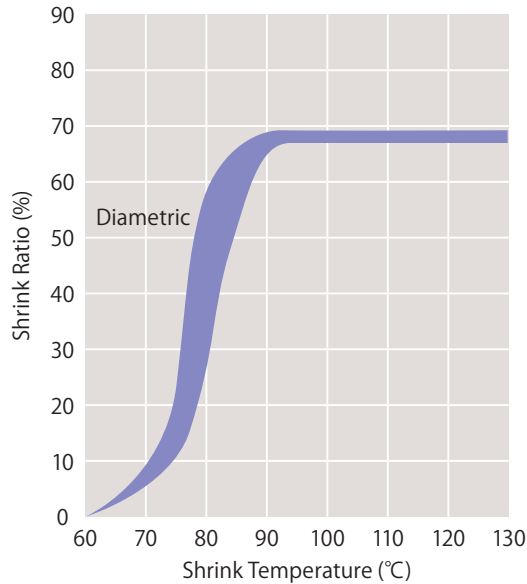
CSA C22.2 No. 198.1

File No. LR33298 Rating temperature: 125°C
Rating voltage: 600V Flammability: VW-1

Applications

- Insulation, protection and reinforcement of irregular-shaped substrates
- Color identification and bundling for electric wires

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 12.1MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 12.5MPa |
| | Elongation (before aging) | min. 200% | 440% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 450% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 24.8kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 5.8 x 10 ¹⁴ Ω·cm |
| | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 405% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (min.) | |
| 1.5/0.5 | 1.50 | 0.20 | 0.50 | 0.50 | 305 |
| 3/1 | 3.00 | 0.25 | 1.00 | 0.60 | 152.5 |
| 6/2 | 6.0 | 0.25 | 2.00 | 0.70 | 61 |
| 9/3 | 9.0 | 0.30 | 3.00 | 0.80 | 61 |
| 12/4 | 12.0 | 0.30 | 4.00 | 0.85 | 61 |
| 18/6 | 18.0 | 0.35 | 6.0 | 1.00 | 61 |
| 24/8 | 24.0 | 0.40 | 8.0 | 1.20 | 61 |
| 40/13 | 40.0 | 0.40 | 13.0 | 1.25 | 61 |

SUMITUBE™ B8

[125°C rating, semi-rigid flame-retarded heat-shrinkable tubing] UL/CSA recognized

Catalog No. 846 RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked semi-rigid flame-retarded polyolefin
- Shrink temperature : min. 130°C
- Shrink ratio : Radial change: min. 50% Longitudinal change: 0 ±5%
- Continuous operating temperature : -55 to 125°C

Features

- UL/CSA recognized
- Semi-rigid
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224

File No. E48762 Catalog No. SUMITUBE™ B8 or 846
 Rating temperature: 125°C Rating voltage: 600V Flammability: VW-1

CSA C22.2 No. 198.1

File No. LR33298 Rating temperature: 125°C
 Rating voltage: 600V Flammability: VW-1

Electrical Appliance and Material Safety Law (Japan)

Flammability rating (-F) test registration No.: F-ST53-009 to F-ST53-012

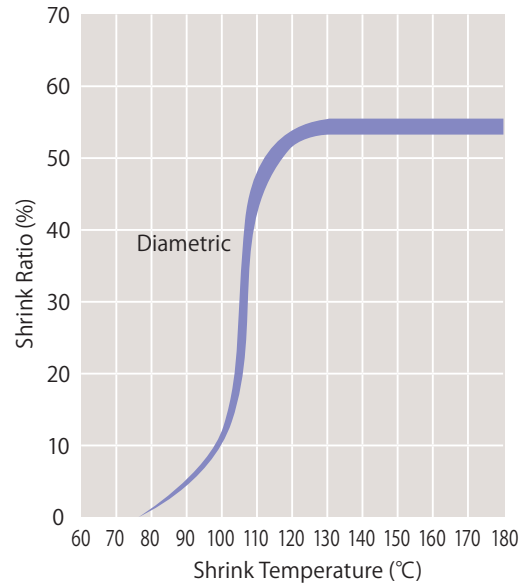
Marking on Surface

◆SUMITOMO-K CSA SR HS X PO TUBING 125°C SUMITUBE

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire which require high strength mechanical abuse
- Corrosion protection for pipes

Shrink Properties



Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray, White

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 13.8MPa | 19.0MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 9.7MPa | 17.1MPa |
| | Elongation (before aging) | min. 200% | 340% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 340% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 15.0kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 2.3 x 10 ¹⁶ Ω·cm |
| | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 304% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------|-----------------------|------------------------|----------------|------------------------|
| | Inside diameter | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 3/64 | 1.60 ± 0.30 | 0.25 | 0.60 | 0.51 ± 0.07 | 1.22 |
| 1/16 | 2.00 ± 0.30 | 0.25 | 0.80 | 0.51 ± 0.07 | 1.22 |
| 3/32 | 2.70 ± 0.30 | 0.25 | 1.20 | 0.51 ± 0.07 | 1.22 |
| 1/8 | 3.50 ± 0.30 | 0.25 | 1.60 | 0.51 ± 0.07 | 1.22 |
| 3/16 | 5.20 ± 0.30 | 0.30 | 2.40 | 0.64 ± 0.07 | 1.22 |
| 1/4 | 6.8 ± 0.4 | 0.30 | 3.20 | 0.64 ± 0.07 | 1.22 |
| 3/8 | 10.0 ± 0.4 | 0.35 | 4.80 | 0.76 ± 0.07 | 1.22 |
| 1/2 | 13.2 ± 0.5 | 0.35 | 6.4 | 0.76 ± 0.07 | 1.22 |
| 3/4 | 20.0 ± 0.6 | 0.35 | 9.5 | 0.76 ± 0.07 | 1.22 |
| 1 | 26.6 ± 0.8 | 0.40 | 12.7 | 0.89 ± 0.12 | 1.22 |

| | |
|----------------------------|--|
| SUMITUBE | |
| A | |
| C | |
| A4 | |
| LA | |
| C (UL) | |
| D | |
| A2 | |
| SUMITUBE | |
| B | |
| LB | |
| SUMITUBE | |
| F (Z) | |
| F3 (Z) | |
| NHR2 | |
| NHR4 | |
| V (300V) | |
| V (600V) | |
| SUMITUBE | |
| F2 (Z) | |
| F4 (Z) | |
| B2 | |
| B2 (3X) | |
| B8 | |
| SUMITUBE | |
| K | |
| K2 | |
| SUMITUBE | |
| KH200 (TW) | |
| SUMITUBE | |
| KH230 (TW) | |
| B6 | |
| SUMITUBE | |
| R | |
| AN25 | |
| SUMITUBE | |
| W | |
| SUMITUBE | |
| O2C | |
| W3C | |
| SUMITUBE | |
| O2B2 | |
| W3F2 | |
| SUMITUBE | |
| W3B2 | |
| W3B2 (4X) | |
| SA2 | |
| SA3 | |
| IRRAX™TUBE | |
| IRRAX™TAPE | |
| IRRAX™TUBE | |
| A | |
| B | |
| F2 | |
| F2 (UL) | |
| V2 | |
| RP3 | |
| B8 | |
| ER2 | |
| NHR | |
| FE2 | |
| IRRAX™TAPE | |
| VZL | |
| IRRAX™SLEEVE | |
| IRRAX™SLEEVE | |
| SCM2 | |
| SBI 300/350 | |
| SNHM | |
| Composite articles | |
| SUMISEAL | |
| SUMITUBE SA3 CAP | |
| Processing equipment | |
| SUMISHRINKER / HEATING GUN | |

SUMITUBE™ K

[Highly heat/oil/chemical resistant, clear, flame-retarded heat-shrinkable tubing] SAE/UL/CSA recognized

Catalog No. 852 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

Basic Properties

- Material : Irradiated cross-linked semi-rigid flame-retarded PVDF
- Shrink temperature : min. 170°C
- Shrink ratio : Radial change: min. 50% Longitudinal change (K): 0 ±10%
- Continuous operating temperature : -55 to 175°C

Features

- SAE/UL/CSA recognized
- Flame-retarded
- Transparent colors
- Thin wall
- Semi-rigid
- Highly resistant against oil and chemicals

Specifications/Approvals

SAE-AS23053/8

UL224

File No. E75077 Catalog No. SUMITUBE™ K or 852

Rating temperature: 150°C Rating voltage: 600V Flammability: VW-1

CSA C22.2 No. 198.1

File No. LR33298 Rating temperature: 150°C Rating voltage: 600V

Flammability: VW-1

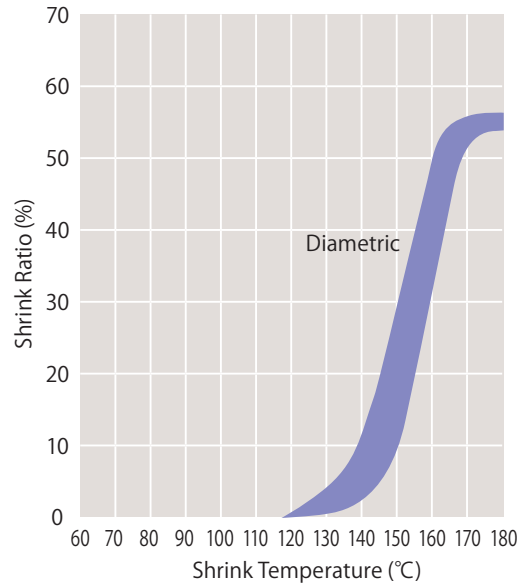
Electrical Appliance and Material Safety Law (Japan)

Flammability rating (-F-) test registration No.: F-ST53-017 to F-ST53-020

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Protection for wire and devices which are used under high temperature or exposed to chemicals and oils
- Mechanical protection for metal wire
- Fixing and protection of cable markers
- Insulation and protection of thermistors, resistors and capacitors

Shrink Properties



Colors

- Clear

Properties [SAE-AS23053/8]

| Properties | Items | Requirements | Typical values*1 |
|------------|---------------------------------|---|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 34.5MPa | 41.0MPa |
| | Elongation (before aging) | min. 150% | 405% |
| | Elongation (after aging) | 250°C x 7 days, min. 50% | 357% |
| | Low temperature flexibility | -55°C x 4 hours, no crack | Pass |
| | Heat shock | 300°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 31.5kV/mm (for 1/2 inch and smaller) min. 23.6kV/mm (for over 1/2 inch) | 43.6kV/mm 31.4kV/mm |
| | Volume resistivity | min. 1.0 x 10 ¹³ Ω·cm | 3.8 x 10 ¹⁵ Ω·cm |
| Chemical | Transparent stability | 175°C x 24 hours, no change | Pass |
| | Fluid resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 34.5MPa | 38.1MPa |
| | Dielectric strength | min. 19.7kV/mm | 28.6kV/mm |
| | Flammability (UL224) | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------------|-----------------------|------------------------|----------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 3/64 | 1.20 | 0.10 | 0.60 | 0.25 ± 0.05 | 1.22 |
| 1/16 | 1.60 | 0.10 | 0.80 | 0.25 ± 0.05 | 1.22 |
| 3/32 | 2.40 | 0.12 | 1.20 | 0.27 ± 0.04 | 1.22 |
| 1/8 | 3.20 | 0.12 | 1.60 | 0.27 ± 0.04 | 1.22 |
| 3/16 | 4.80 | 0.12 | 2.40 | 0.27 ± 0.04 | 1.22 |
| 1/4 | 6.4 | 0.14 | 3.20 | 0.33 ± 0.05 | 1.22 |
| 3/8 | 9.5 | 0.14 | 4.75 | 0.33 ± 0.05 | 1.22 |
| 1/2 | 12.7 | 0.14 | 6.4 | 0.33 ± 0.05 | 1.22 |
| 3/4 | 19.1 | 0.18 | 9.5 | 0.43 ± 0.07 | 1.22 |
| 1 | 25.4 | 0.20 | 12.7 | 0.48 ± 0.07 | 1.22 |

IRRAX™TUBE IRRAX™TAPE

| |
|-----------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| IRRAXTUBE |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAXTAPE |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| IRRAXSLEEVE |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ K2

[Highly heat/oil/chemical resistant, clear, flame-retarded heat-shrinkable tubing] SAE/UL recognized

Catalog No. 875  RoHS directive 10 substances

 Waterproofing  Flame-retarded  UL recognized  CSA recognized



Basic Properties

- Material : Irradiated cross-linked semi-rigid flame-retarded PVDF
- Shrink temperature : min. 150°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change (K2): -10 to 5%
- Continuous operating temperature : -55 to 175°C

Features

- SAE/UL recognized
- Flame-retarded
- Transparent colors
- Thin wall
- Semi-rigid (more flexible than SUMITUBE K)
- Highly resistant against oil and chemicals
- Available on spools

Specifications/Approvals

SAE-AS23053/18 Class 1

UL224

File No. E70631 Catalog No. SUMITUBE™ K2 or 875
Flammability: VW-1

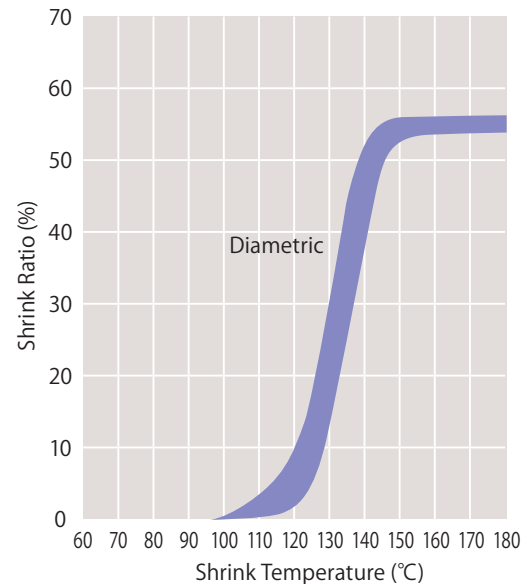
Electrical Appliance and Material Safety Law (Japan)

Flammability rating (-F) test registration No.: F-ST53-017 to F-ST53-020

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Protection for wire and devices which are used under high temperature or exposed to chemicals and oils
- Mechanical protection for metal wire
- Fixing and protection of cable markers
- Insulation and protection of thermistors, resistors and capacitors

Shrink Properties



Colors

- Black, Red, Green, Blue, White, Clear

Properties [SAE-AS23053/18 Class 1]

| Properties | Items | Requirements | Typical values*1 |
|------------|---------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 24.1MPa | 37.8MPa |
| | Elongation (before aging) | min. 200% | 404% |
| | Elongation (after aging) | 250°C x 7 days, min. 100% | 383% |
| | Low temperature flexibility | -55°C x 4 hours, no crack | Pass |
| | Heat shock | 275°C x 4 hours, no crack | Pass |
| Electrical | Specific gravity | max. 1.90 | 1.75 |
| | Dielectric strength | min. 15.7kV/mm | 35.4kV/mm |
| | Volume resistivity | min. $1.0 \times 10^{11} \Omega \cdot \text{cm}$ | $2.8 \times 10^{15} \Omega \cdot \text{cm}$ |
| Chemical | Transparent stability | 200°C x 24 hours, no change | Pass |
| | Fluid resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 13.9MPa | 37.4MPa |
| | Dielectric strength | min. 15.7kV/mm | 25.2kV/mm |
| | Elongation | min. 100% | 419% |
| | Flammability (UL224) | Flame-retarded, pass VW-1 | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------------|-----------------------|------------------------|-----------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 3/64 | 1.20 | 0.10 | 0.60 | 0.25 ± 0.05 | 305 |
| 1/16 | 1.60 | 0.10 | 0.80 | 0.25 ± 0.05 | 305 |
| 3/32 | 2.40 | 0.12 | 1.20 | 0.27 ± 0.04 | 152.5 |
| 1/8 | 3.20 | 0.12 | 1.60 | 0.27 ± 0.04 | 152.5 |
| 3/16 | 4.80 | 0.12 | 2.40 | 0.27 ± 0.04 | 61 |
| 1/4 | 6.4 | 0.14 | 3.20 | 0.33 ± 0.05 | 61 |
| 3/8 | 9.5 | 0.14 | 4.75 | 0.33 ± 0.05 | 61 |
| 1/2 | 12.7 | 0.14 | 6.4 | 0.33 ± 0.05 | 61 |
| 3/4 | 19.1 | 0.18 | 9.5 | 0.43 ± 0.07 | 61 |
| 1 | 25.4 | 0.20 | 12.7 | 0.48 ± 0.07 | 61 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAXTAPE VZL |

IRRAX™SLEEVE

| |
|-------------------------|
| SCM2 |
| IRRAXSLEEVE SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

SUMITUBE™ KH200(TW)/KH230(TW)

[Highly heat resistance/High flexibility heat-shrinkable tubing]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized
(SUMITUBE™KH200(TW) only)



SUMITUBE™

A
C
A4
SUMITUBE LA
C (UL)
D
A2

SUMITUBE B
LB

F (Z)
F3 (Z)
SUMITUBE NHR2
NHR4
V (300V)
V (600V)

F2 (Z)
F4 (Z)
SUMITUBE B2
B2 (3X)
B8

SUMITUBE K
K2

SUMITUBE KH200 (TW)
SUMITUBE KH230 (TW)

B6
SUMITUBE R
AN25

SUMITUBE W

SUMITUBE O2C
W3C

O2B2
W3F2
W3B2
SUMITUBE W3B2 (4X)
SA2
SA3

IRRAX™TUBE
IRRAX™TAPE

A
B
F2
F2 (UL)
V2
IRRAXTUBE RP3
B8
ER2
NHR
FE2
IRRAXTAPE VZL

IRRAX™SLEEVE

SCM2
IRRAXSLEEVE SBI
300/350
SNHM

Composite articles

SUMISEAL
SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Cross-linked flexible flame-retarded fluoroelastomer
- Shrink temperature : min. 150°C
- Shrink ratio : Radial change: min. 50%
: Longitudinal change: -10 to 5%
- Continuous operating temperature :
-55 to 200°C(SUMITUBE™KH200(TW))
-55 to 230°C(SUMITUBE™KH230(TW))

Features

- SAE/UL recognized (SUMITUBE™KH200(TW))
SAE recognized (SUMITUBE™KH230(TW))
- Flame-retarded ■ Transparent colors (SUMITUBE™KH200(TW))
- Thin wall ■ High flexibility
- Highly resistant against oil and chemicals

Specifications/Approvals

SUMITUBE™KH200(TW) SAE-AS23053/18 Class 3
UL224

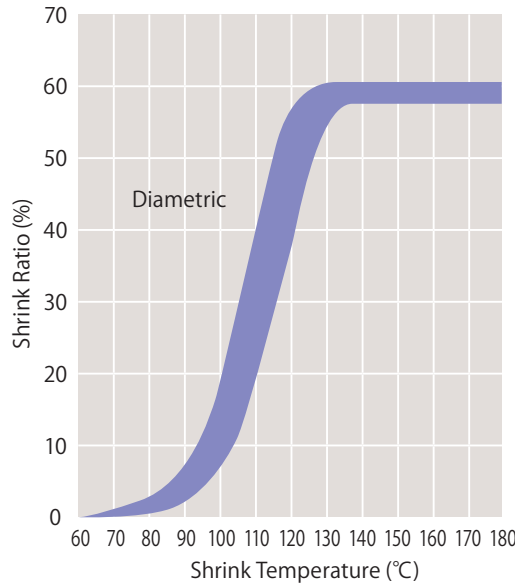
File No.E70631 Catalog No. SUMITUBE™KH200(TW)
Flammability: VW-1

SUMITUBE™KH230(TW)
SAE-AS23053/18 Class 3

Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Protection for wire and devices which are used under high temperature or exposed to chemicals and oils
- Fixing and protection of cable makers (SUMITUBE™KH200(TW))
- Insulation and protection of thermistors, resistors and capacitors
- Application for aerospace with requirement of outgassing

Shrink Properties



Colors

- Clear (SUMITUBE™KH200(TW))
- Black, Red, Yellow, Blue, White (SUMITUBE™KH230(TW))

Properties [SAE-AS23053/18 Class 3]

| Properties | Items | Requirements | Typical values*1 | |
|------------|------------------------------------|--|-----------------------------|-----------------------------|
| | | | SUMITUBE™KH200(TW) | SUMITUBE™KH230(TW) |
| Mechanical | Tensile strength (before aging) | min. 10.3MPa | 28.2MPa | 28.6MPa |
| | Elongation (before aging) | min. 200% | 414% | 425% |
| | Elongation (after aging) | 250°C x 7days, min. 100% | 444% | 490% |
| | Specific gravity | max. 2.0 | 1.9 | 1.9 |
| | Low temperature flexibility | -55°C x 4hours, no crack | Pass | Pass |
| Electrical | Heat shock | 275°C x 4 hours, no crack | Pass | Pass |
| | Dielectric strength | min. 15.7kV/mm | 29.6kV/mm | 35.2kV/mm |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹¹ Ω·cm | 2.7 x 10 ¹⁴ Ω·cm | 1.1 x 10 ¹⁵ Ω·cm |
| | Water absorption | 23°C x 24 hours, max. 0.50% | 0.01% | 0.01% |
| | Corrosion against bare copper | 160°C x 16 hours, no corrosion | Pass | Pass |
| | Fluid resistance (24°C x 24 hours) | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | | |
| | Tensile strength | min. 6.9Mpa | 26.6MPa | 27.5MPa |
| Chemical | Elongation | min. 100% | 422% | 375% |
| | Dielectric strength | min. 15.7kV/mm | 29.9kV/mm | 23.3kV/mm |
| | Flammability (UL224) | Flame-retarded, pass VW-1 | Pass | Pass |
| | Outgassing | NASA SP-0022A | Pass | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------------|-----------------------|------------------------|----------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 1/8 | 3.20 | 0.12 | 1.60 | 0.27 ± 0.04 | 30.5 |
| 3/16 | 4.80 | 0.12 | 2.40 | 0.27 ± 0.04 | 30.5 |
| 1/4 | 6.4 | 0.14 | 3.20 | 0.33 ± 0.05 | 30.5 |
| 3/8 | 9.5 | 0.14 | 4.75 | 0.33 ± 0.05 | 30.5 |
| 1/2 | 12.7 | 0.14 | 6.4 | 0.33 ± 0.05 | 30.5 |
| 3/4* | 19.1 | 0.18 | 9.5 | 0.43 ± 0.07 | 15.25 |
| 1* | 25.4 | 0.20 | 12.7 | 0.48 ± 0.07 | 15.25 |

*Release paper is included to prevent inner adhesive contact.

SUMITUBE™ B6

[Semi-rigid flame-retarded heat-shrinkable tubing]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked semi-rigid flame-retarded polyolefin
- Shrink temperature : min. 130°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: 0 ±5%
- Continuous operating temperature : -55 to 135°C

Features

- Semi-rigid
- Abrasion resistant

Specifications/Approvals

SFP standard (RE4-H319)

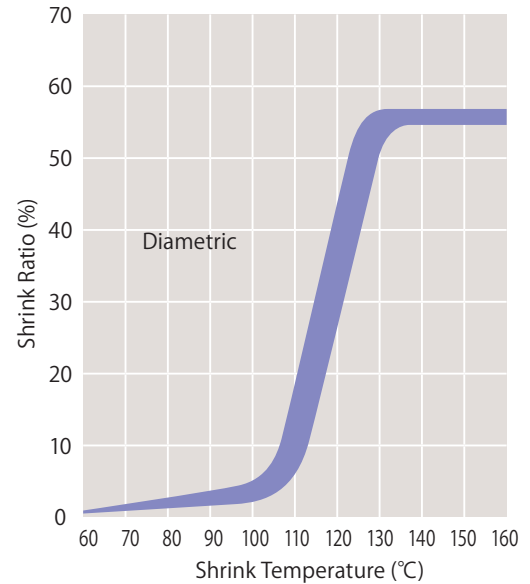
Applications

- Mechanical and chemical protection of wire harnesses used in aerospace equipment
- Holding lengths of sensor wires straight, as well as providing insulation and mechanical protection

Colors

- Black

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|---------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 13.8MPa | 17.0MPa |
| | Elongation (before aging) | min. 200% | 450% |
| | Elongation (after aging) | 175°C x 7 days, min. 150% | 425% |
| | Secant modulus | min. 172MPa | 250MPa |
| | Low temperature flexibility | -55°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 19.7kV/mm | 32.2kV/mm |
| | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 1.4 x 10 ¹⁵ Ω·cm |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.50% | 0.10% |
| | Specific gravity | max. 1.35 | 1.25 |
| | Corrosion against bare copper | 150°C x 16 hours, no corrosion | Pass |
| | Fluid resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 11.0MPa | 16.7MPa |
| | Dielectric strength | min. 15.8kV/mm | 40.1kV/mm |
| | Flammability | Self-extinguish within 60 sec. | Pass |

*1: For reference use only. The test methods is based on SAE-AS23053.

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | |
|-------------------|------------------------|-----------------------|------------------------|----------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness |
| 1/8 | 3.20 | 0.35 | 1.60 | 0.51 ± 0.07 |
| 3/16 | 4.80 | 0.35 | 2.36 | 0.64 ± 0.07 |
| 1/4 | 6.4 | 0.35 | 3.20 | 0.64 ± 0.07 |
| 3/8 | 9.5 | 0.35 | 4.80 | 0.76 ± 0.07 |
| 1/2 | 12.7 | 0.35 | 6.4 | 0.76 ± 0.07 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

SUMITUBE™ R

[Rubber-like, flame-retarded heat-shrinkable tubing]
SAE

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 130°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: min. -10%
- Continuous operating temperature : -70 to 121°C

Features

- SAE Flexible
- Flame-retarded Highly resistant against oil

Specifications/Approvals

SAE-AS23053/1 Class 1, 2

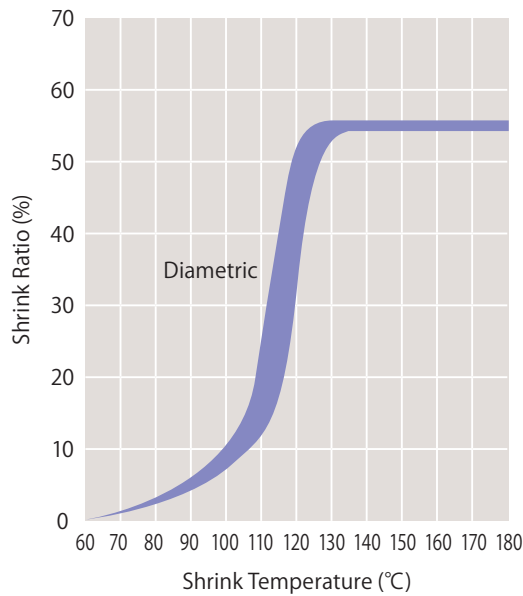
Applications

- Used for roller lining as a rubber substitute
- Insulation, protection and reinforcement for wire and devices where flexibility is required
- Insulating rubber-sheathed cable joints
- Preventing buckling in lead wires

Colors

- Black

Shrink Properties



Properties [SAE-AS23053/1 Class 2]

| Properties | Items | Requirements | Typical values*1 |
|------------|------------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 16.0MPa |
| | Elongation (before aging) | min. 225% | 495% |
| | Elongation (after aging) | 121°C x 7 days, min. 175% | 430% |
| | Low temperature flexibility | -70°C x 4 hours, no crack | Pass |
| | Heat shock | 200°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength (before aging) | min. 11.8kV/mm | 25.0kV/mm |
| | Dielectric strength (after aging) | 121°C x 7 days, min. 19.7kV/mm | 23.5kV/mm |
| | Volume resistivity | min. $1.0 \times 10^{15} \Omega \cdot \text{cm}$ | $3.1 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Corrosion against bare copper | 150°C x 16 hours, no corrosion | Pass |
| | Fluid resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 6.9MPa | 12.2MPa |
| | Elongation | min. 175% | 433% |
| | Dielectric strength | min. 9.8kV/mm | 23.0kV/mm |
| | Flammability | ASTM D2671 Procedure A | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------------|-----------------------|------------------------|-----------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 1/4 | 6.4 | 0.45 | 3.20 | 0.89 ± 0.25 | 61 |
| 3/8 | 9.5 | 0.55 | 4.80 | 1.01 ± 0.25 | 30.5 |
| 1/2 | 12.7 | 0.60 | 6.4 | 1.22 ± 0.38 | 30.5 |
| 3/4 | 19.1 | 0.70 | 9.5 | 1.45 ± 0.38 | 30.5 |
| 1 | 25.4 | 0.90 | 12.7 | 1.78 ± 0.51 | 30.5 |
| 1-1/4 | 31.8 | 1.00 | 15.9 | 2.20 ± 0.51 | 30.5 |
| 1-1/2 | 38.1 | 1.20 | 19.1 | 2.41 ± 0.51 | 30.5 |
| 1-3/4 | 44.5 | 1.30 | 22.2 | 2.71 ± 0.51 | 30.5 |
| 2 | 50.8 | 1.30 | 25.4 | 2.79 ± 0.51 | 30.5 |

SUMITUBE™

A
C
A4
SUMITUBE LA
C (UL)
D
A2

SUMITUBE B
LB

F (Z)
F3 (Z)
SUMITUBE NHR2
NHR4
V (300V)
V (600V)

F2 (Z)
F4 (Z)
SUMITUBE B2
B2 (3X)
B8

SUMITUBE K
K2

SUMITUBE KH200 (TW)

SUMITUBE KH230 (TW)

B6

SUMITUBE R
AN25

SUMITUBE W

SUMITUBE O2C
W3C

O2B2
W3F2
SUMITUBE W3B2
W3B2 (4X)
SA2
SA3

IRRAX™TUBE IRRAX™TAPE

A
B
F2
F2 (UL)
V2
IRRAXTUBE RP3
B8
ER2
NHR
FE2
IRRAXTAPE VZL

IRRAX™SLEEVE

SCM2
IRRAXSLEEVE SBI
300/350
SNHM

Composite articles

SUMISEAL
SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ AN25

[Highly heat/oil/chemical resistant, flame-retarded heat-shrinkable tubing] SAE recognized

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Irradiated cross-linked flexible flame-retarded elastomer
- Shrink temperature : min. 170°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: 0 ±10%
- Continuous operating temperature : -75 to 150°C

Features

- SAE recognized
- Flame-retarded
- Flexible
- Highly resistant against oil and chemicals

Specifications/Approvals

- SAE-AS23053/16

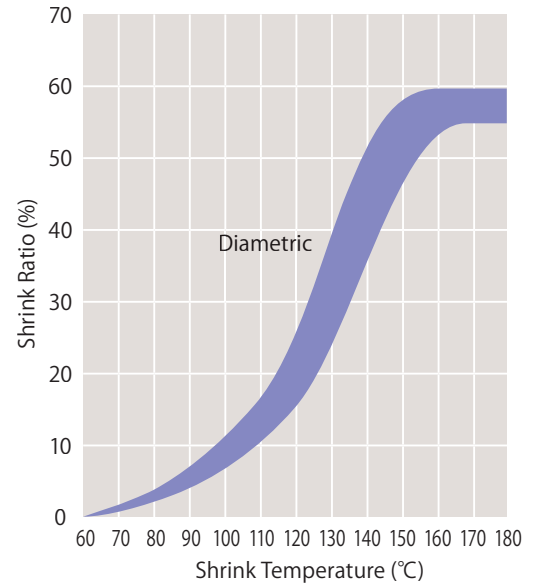
Applications

- Mechanical and chemical protection of wire harnesses used in aerospace and automotive equipment

Colors

- Black

Shrink Properties



Properties [SAE-AS-23053/16]

| Properties | Items | Requirements | Typical values*1 |
|------------|-----------------------------------|---------------------------------|------------------|
| Mechanical | Tensile strength (before aging) | min. 11.7MPa | 19MPa |
| | Tensile strength (after aging) | 150°C x 168 hours, min. 10.4MPa | 13.9MPa |
| | Elongation (before aging) | min. 250% | 400% |
| | Elongation (after aging) | 150°C x 168 hours, min. 200% | 250% |
| | Heat shock | 200°C x 4 hours, no crack | Pass |
| | Cold bend | -65°C x 4 hours, no crack | Pass |
| | Tensile stress at 100% elongation | max. 10.3MPa | 5MPa |
| Electrical | Dielectric breakdown | min. AC11.9kV/mm | 25.6kV/mm |
| Chemical | Flammability | ASTM D2671 Procedure B | Pass |

*1: For reference use only

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-------------------|------------------------|-----------------------|------------------------|----------------|------------------------|
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness | |
| 1/8 *2 | 3.20 | 0.35 | 1.60 | 0.75 ± 0.15 | 150 |
| 3/16 *2 | 4.80 | 0.45 | 2.40 | 0.85 ± 0.20 | 60 |
| 1/4 | 6.40 | 0.45 | 3.20 | 0.90 ± 0.20 | 60 |
| 3/8 | 9.5 | 0.55 | 4.75 | 1.00 ± 0.20 | 60 |
| 1/2 | 12.7 | 0.60 | 6.4 | 1.20 ± 0.30 | 60 |
| 3/4 | 19.1 | 0.70 | 9.5 | 1.45 ± 0.35 | 30 |
| 1 | 25.4 | 0.90 | 12.7 | 1.80 ± 0.45 | 30 |
| 1-1/2 | 38.0 | 1.20 | 19.0 | 2.40 ± 0.50 | 30 |
| 2 | 51.0 | 1.30 | 25.4 | 2.80 ± 0.50 | 30 |

*2: These sizes are not SAE recognized.

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
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| |
|----|
| B6 |
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| |
|---|
| R |
|---|

| |
|------|
| AN25 |
|------|

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
|-----|

| |
|-----|
| W3C |
|-----|

| |
|------|
| O2B2 |
|------|

| |
|------|
| W3F2 |
|------|

| |
|------|
| W3B2 |
|------|

| |
|-----------|
| W3B2 (4X) |
|-----------|

| |
|-----|
| SA2 |
|-----|

| |
|-----|
| SA3 |
|-----|

IRRAX™TUBE IRRAX™TAPE

| |
|---|
| A |
|---|

| |
|---|
| B |
|---|

| |
|----|
| F2 |
|----|

| |
|---------|
| F2 (UL) |
|---------|

| |
|----|
| V2 |
|----|

| |
|-----|
| RP3 |
|-----|

| |
|----|
| B8 |
|----|

| |
|-----|
| ER2 |
|-----|

| |
|-----|
| NHR |
|-----|

| |
|-----|
| FE2 |
|-----|

| |
|-----|
| VZL |
|-----|

IRRAX™SLEEVE

| |
|------|
| SCM2 |
|------|

| |
|-------------|
| SBI 300/350 |
|-------------|

| |
|------|
| SNHM |
|------|

Composite articles

| |
|----------|
| SUMISEAL |
|----------|

| |
|------------------|
| SUMITUBE SA3 CAP |
|------------------|

Processing equipment

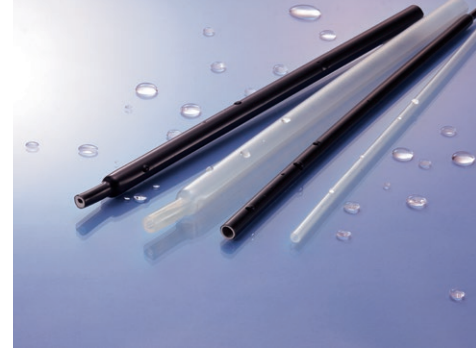
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|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

SUMITUBE™ W

[Dual wall heat-shrinkable tubing with meltable liner]

Catalog No. 803 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Outer : Irradiated cross-linked flexible polyolefin
: Inner : Meltable polyolefin
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: min. 60%
: Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Dual wall structure using two concentric tubings
- Effective filling for large gaps and voids

Specifications/Approvals

SFP standard (RE4-1080)

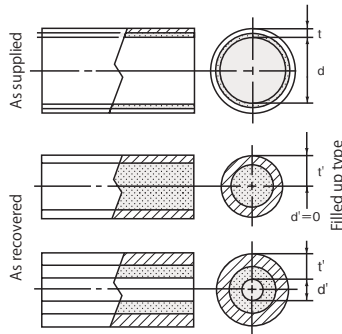
Applications

- Insulation, protection and reinforcement for termination and joints of electric wire
- Corrosion protection of pipes or bimetallic joints

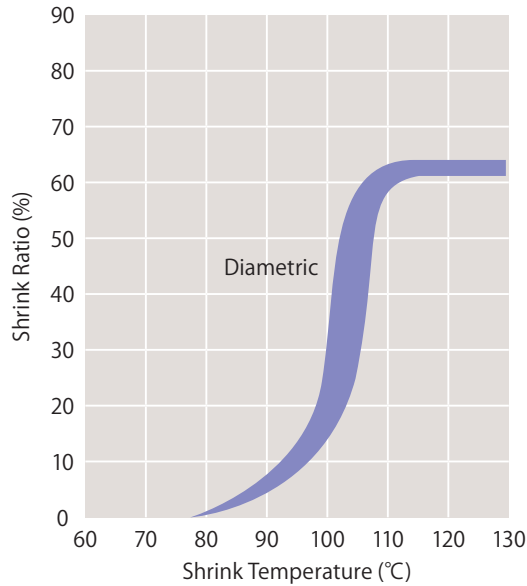
Colors

- Black (Inner: Gray), Clear (Inner: Clear)

d: Supplied inside diameter t: Supplied wall thickness
 d': Recovered inside diameter t': Recovered wall thickness



Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|----------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 13.8MPa |
| | Elongation | min. 200% | 475% |
| | Specific gravity | — | 0.94 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.7 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.30% | 0.06% |
| | Flammability | Flammable | — |

*1: For reference use only; data are for outer tubing

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|---------------------|---------------------------|-----------------------------|----------------------------|------------------------|
| | Inside diameter (d) | Wall thickness (nom.) (t) | Inside diameter (max.) (d') | Wall thickness (nom.) (t') | |
| 1.5 | 1.70 ± 0.20 | 0.50 | Filled up | 1.10 | 0.3 |
| 2.5 | 2.70 ± 0.20 | 0.50 | Filled up | 1.40 | 0.3 |
| 3.5 | 3.50 ± 0.30 | 0.55 | Filled up | 1.60 | 0.3 |
| 4.5 | 4.60 ± 0.30 | 0.60 | Filled up | 2.00 | 0.3 |
| 5.5 | 5.50 ± 0.40 | 0.65 | Filled up | 2.20 | 0.3 |
| 7 | 7.3 ± 0.5 | 0.65 | 2.80 | 1.50 | 0.3 |
| 8 | 8.2 ± 0.5 | 0.75 | 2.80 | 1.80 | 0.3 |
| 9 | 9.0 ± 0.5 | 0.75 | 2.80 | 1.90 | 0.3 |
| 10 | 10.0 ± 0.5 | 0.75 | 3.50 | 1.90 | 0.3 |
| 11 | 11.0 ± 0.5 | 0.80 | 4.00 | 2.00 | 0.3 |
| 14 | 14.0 ± 0.6 | 0.80 | 5.50 | 2.10 | 0.3 |

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

SUMITUBE W

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ O2C

[Dual wall heat-shrinkable tubing with meltable adhesive for fixing and waterproofing of straight-shaped objects]

Catalog No. 942, 840 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Outer: Irradiated cross-linked flexible polyolefin
Inner: Meltable adhesive
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: min. 50%
Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Watertight sealing with good adhesion to metals, polyolefin and PVC
- Flexible
- Thinner adhesive (than SUMITUBE™ W3C)

Specifications/Approvals

SFP standard (RE4-8592)

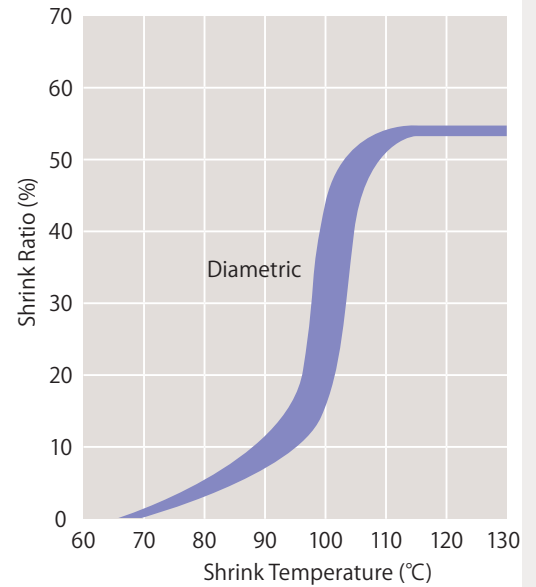
Applications

- Corrosion protection of pipes
- Waterproof sealing for electronic devices
- Insulation and protection for wire joints
- Effective for fixing and waterproofing of pipe-shaped objects

Colors

- Black, Clear

Shrink Properties



| |
|------------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |
| K |
| K2 |
| KH200 (TW) |
| KH230 (TW) |
| B6 |
| R |
| AN25 |
| W |
| O2C |
| W3C |
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-----------------------------------|----------------------------------|-----------------------------|
| Mechanical | Tensile strength (before aging)*2 | min. 10.4MPa | 16.0MPa |
| | Tensile strength (after aging)*2 | 136°C x 7 days, min. 7.3MPa | 14.2MPa |
| | Elongation (before aging) | min. 200% | 562% |
| Electrical | Elongation (after aging) | 136°C x 7 days, min. 100% | 500% |
| | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| Chemical | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 1.6 x 10 ¹⁶ Ω·cm |
| | Corrosion against bare copper | 121°C x 16 hours, no corrosion | Pass |
| | Flammability | Flammable | — |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

Metric size

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (nom.) | Adhesive thickness (nom.) | |
| 2 × 0.3 | 2.00 | 0.30 | 1.00 | 0.60 | 0.20 | 1 |
| 3 × 0.3 | 3.00 | 0.30 | 1.50 | 0.60 | 0.20 | 1 |
| 4 × 0.3 | 4.00 | 0.30 | 2.00 | 0.60 | 0.20 | 1 |
| 5 × 0.3 | 5.00 | 0.30 | 2.50 | 0.60 | 0.20 | 1 |
| 6 × 0.35 | 6.0 | 0.35 | 3.00 | 0.70 | 0.20 | 1 |
| 7 × 0.35 | 7.0 | 0.35 | 3.50 | 0.70 | 0.20 | 1 |
| 8 × 0.35 | 8.0 | 0.35 | 4.00 | 0.70 | 0.20 | 1 |
| 9 × 0.35 | 9.0 | 0.35 | 4.50 | 0.70 | 0.20 | 1 |
| 10 × 0.35 | 10.0 | 0.35 | 5.00 | 0.70 | 0.20 | 1 |

Inch size

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) |
|-------------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (nom.) | Adhesive thickness (nom.) | |
| 1/8 | 3.20 | 0.40 | 1.60 | 0.70 | 0.20 | 1.22 |
| 3/16 | 4.80 | 0.40 | 2.40 | 0.70 | 0.20 | 1.22 |
| 1/4 | 6.4 | 0.40 | 3.20 | 0.75 | 0.20 | 1.22 |
| 3/8 | 9.5 | 0.40 | 4.80 | 0.75 | 0.20 | 1.22 |
| 1/2 | 12.7 | 0.40 | 6.4 | 0.75 | 0.20 | 1.22 |
| 3/4 | 19.1 | 0.45 | 9.5 | 0.90 | 0.20 | 1.22 |
| 1 | 25.4 | 0.55 | 12.7 | 1.10 | 0.20 | 1.22 |

*3: Including inner adhesive

SUMITUBE™ W3C

[Dual wall heat-shrinkable tubing with meltable adhesive for waterproofing of irregular-shaped objects]

Catalog No. 842 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Outer: Irradiated cross-linked flexible polyolefin
: Inner: Meltable adhesive
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: min. 60%
: Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 105°C

Features

- Watertight sealing with good adhesion to metals, polyolefin and PVC
- Flexible
- Thicker adhesive (than SUMITUBE™ O2C)

Specifications/Approvals

SFP standard (RE4-2081)

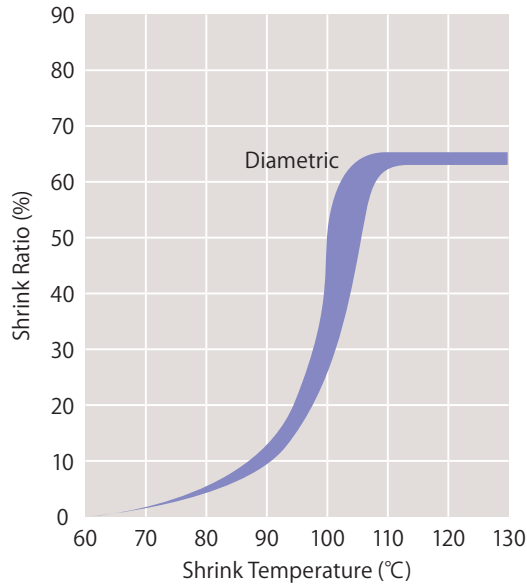
Applications

- Waterproof sealing for electronic devices with irregular shapes
- Encapsulation for wire branches
- Insulation and protection of wire joints

Colors

- Black, Clear

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-----------------------------------|----------------------------------|-----------------------------|
| Mechanical | Tensile strength (before aging)*2 | min. 10.4MPa | 13.9MPa |
| | Tensile strength (after aging)*2 | 136°C x 7 days, min. 7.3MPa | 12.9MPa |
| | Elongation (before aging) | min. 200% | 562% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 500% |
| Electrical | Dielectric withstand | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 1.6 x 10 ¹⁶ Ω·cm |
| Chemical | Corrosion against bare copper | 121°C x 16 hours, no corrosion | Pass |
| | Flammability | Flammable | — |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (inch) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) |
|-------------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (nom.) | Adhesive thickness (nom.) | |
| 1/8 | 3.20 | 0.35 | 0.60 | 0.95 | 0.35 | 1.22 |
| 3/16 | 4.80 | 0.45 | 1.50 | 1.10 | 0.60 | 1.22 |
| 1/4 | 6.4 | 0.45 | 2.00 | 1.20 | 0.65 | 1.22 |
| 3/8 | 9.5 | 0.50 | 3.00 | 1.30 | 0.65 | 1.22 |
| 1/2 | 12.7 | 0.55 | 4.00 | 1.40 | 0.75 | 1.22 |
| 3/4 | 19.1 | 0.65 | 8.0 | 1.60 | 0.80 | 1.22 |
| 1 | 25.4 | 0.75 | 10.2 | 1.90 | 0.80 | 1.22 |

*3: Including inner adhesive

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ O2B2

[Dual wall, flame-retarded heat-shrinkable tubing with meltable adhesive for fixing and waterproofing of straight-shaped objects] SAE/UL/CSA recognized
 Catalog No. 890 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
| KH230 (TW) |

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE
IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

Basic Properties

- Material : Outer : Irradiated cross-linked flexible flame-retarded polyolefin
 : Inner : Meltable adhesive
- Shrink temperature : min. 110°C
- Shrink ratio : Radial change: min. 50%
 : Longitudinal change: +1, -10%
- Continuous operating temperature : -55 to 125°C
 (SAE-AS23053: -55 to 110°C)

Features

- SAE/UL/CSA recognized
- Flame-retarded (PBDE/PBB-free)
- Flexible
- Thinner adhesive (than SUMITUBE™ W3B2)

Specifications/Approvals

UL224
 File No. E75077 Catalog No. SUMITUBE™ O2B2 or 890
 Rating temperature: 125°C Rating voltage: 600V

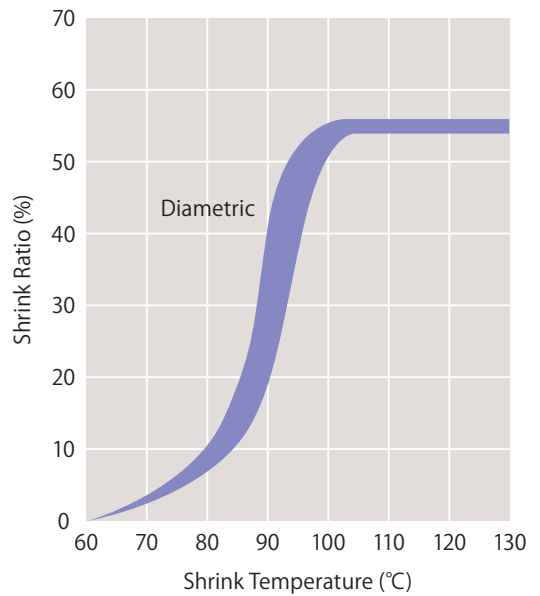
CSA C22.2 No. 198.1
 File No. LR33298 Rating temperature: 125°C
 Rating voltage: 600V

SAE-AS23053/4 Class 2

Applications

- Corrosion protection of pipes
- Waterproof sealing for electronic devices
- Insulation and protection for wire joints

Shrink Properties



Colors

- Black

Properties [SAE-AS23053/4 Class 2]

| Properties | Items | Requirements | Typical values*1 |
|----------------------|---|--|------------------------------|
| Mechanical | Tensile strength*2 | min. 10.4MPa | 14.4MPa |
| | Elongation | min. 250% | 472% |
| | Cold impact | -55°C x 3 minutes, no crack | Pass |
| Electrical | Heat shock | 250°C x 4 hours, no crack | Pass |
| | Dielectric strength | min. 11.8kV/mm | 41.1kV/mm |
| Chemical | Volume resistivity | min. 10 ¹⁵ Ω·cm | 2.11 x 10 ¹⁵ Ω·cm |
| | Water absorption | 23°C x 24 hours, max. 1.0% | 0.49% |
| | Corrosion against bare copper | 121°C x 16 hours, no corrosion | Pass |
| | Color stability | 175°C x 24 hours, no change | Pass |
| | Fluid Resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | Pass |
| | Tensile strength | min. 6.2MPa | 10.4MPa |
| Dielectric strength | min. 7.9kV/mm | 38.1kV/mm | |
| Flammability (UL224) | Flame-retarded, pass, all tubing flame test | Pass | |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (inch) | As supplied (mm) | | After recocered (mm) | | Unit length (min.) (m) |
|-------------------|------------------------|------------------------|----------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Inside diameter (max.) | Wall thickness*3 | Adhesive thickness (nom.) | |
| 1/4 | 6.4 | 3.20 | 0.70 ± 0.10 | 0.10 | 1.22 |
| 3/8 | 9.5 | 4.75 | 0.70 ± 0.10 | 0.10 | 1.22 |
| 1/2 | 12.7 | 6.4 | 0.80 ± 0.10 | 0.10 | 1.22 |
| 3/4 | 19.1 | 9.5 | 0.90 ± 0.10 | 0.10 | 1.22 |
| 1 | 25.4 | 12.7 | 1.10 ± 0.20 | 0.20 | 1.22 |
| 1-1/2 | 38.1 | 19.1 | 1.20 ± 0.20 | 0.20 | 1.22 |

*3: Including inner adhesive

SUMITUBE™ W3F2

[Dual wall, flame-retarded heat-shrinkable tubing with meltable adhesive for waterproofing of irregular-shaped objects] UL/CSA recognized

Catalog No. 843 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
| KH230 (TW) |

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE
IRRAX™TAPE

| |
|---------------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAXTAPE VZL |

IRRAX™SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

Basic Properties

- Material : Outer : Irradiated cross-linked flexible flame-retarded polyolefin
: Inner : Meltable adhesive
- Shrink temperature : min. 110°C
- Shrink ratio : Radial change: min. 60%
: Longitudinal change: min. -15%
- Continuous operating temperature : -55 to 125°C

Features

- UL/CSA recognized
- Watertight sealing with good adhesion to metals, polyolefin and PVC
- Flame-retarded (PBDE/PBB-free)
- Flexible

Specifications/Approvals

UL224

File No. E75077 Catalog No. SUMITUBE™ W3F2 or 843
Rating temperature: 125°C Rating voltage: 600V

CSA C22.2 No. 198.1

File No. LR33298 Rating temperature: 125°C
Rating voltage: 600V

Marking on Surface

CSA HS X PO MELTABLE LINER 125°C ◆SUMITOMO-K
SUMITUBE W3F2 843 125°C

Applications

- Waterproof sealing for electronic devices with irregular shapes
- Encapsulation for wire branches
- Insulation and protection for wire joints

Colors

- Black

Properties [UL224]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength (before aging)*2 | min. 10.4MPa | 12.0MPa |
| | Tensile strength (after aging)*2 | 158°C x 7 days, min. 7.3MPa | 11.6MPa |
| | Elongation (before aging) | min. 200% | 438% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 425% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| | Cold bend | -30°C x 1 hour, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric strength (before aging) | min. AC2.5kV | 24.9kV |
| | Dielectric strength (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $4.4 \times 10^{14} \Omega \cdot \text{cm}$ |
| Chemical | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Flammability | Flame-retarded, pass All Tubing Flame Test | Pass |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade (inch) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) |
|--------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (nom.) | Adhesive thickness (nom.) | |
| 1/8 | 3.20 | 0.35 | 0.60 | 0.95 | 0.35 | 1.22 |
| 3/16 | 4.80 | 0.45 | 1.50 | 1.10 | 0.60 | 1.22 |
| 1/4 | 6.4 | 0.45 | 2.00 | 1.20 | 0.65 | 1.22 |
| 3/8 | 9.5 | 0.50 | 3.00 | 1.30 | 0.65 | 1.22 |
| 1/2 | 12.7 | 0.55 | 4.00 | 1.40 | 0.75 | 1.22 |
| 3/4 | 19.1 | 0.65 | 8.0 | 1.60 | 0.80 | 1.22 |
| 1 | 25.4 | 0.75 | 10.2 | 1.90 | 0.80 | 1.22 |

*3: Including inner adhesive

SUMITUBE™ W3B2

[Dual wall, flame-retarded heat-shrinkable tubing with meltable adhesive for waterproofing of irregular-shaped objects]
SAE/UL/CSA recognized

Catalog No. 891 RoHS directive 10 substances



Basic Properties

- **Material** : Outer : Irradiated cross-linked flexible flame-retarded polyolefin
: Inner : Meltable adhesive
- **Shrink temperature** : min. 110°C
- **Shrink ratio** : Radial change : min. 60%
: Longitudinal change: -15 to 5%
- **Continuous operating temperature** : -55 to 125°C

Features

- SAE/UL/CSA recognized
- Watertight sealing with good adhesion to metals, polyolefin and PVC
- Flame-retarded (PBDE/PBB-free) ■ Flexible
- Thicker adhesive (than SUMITUBE™ O2B2)

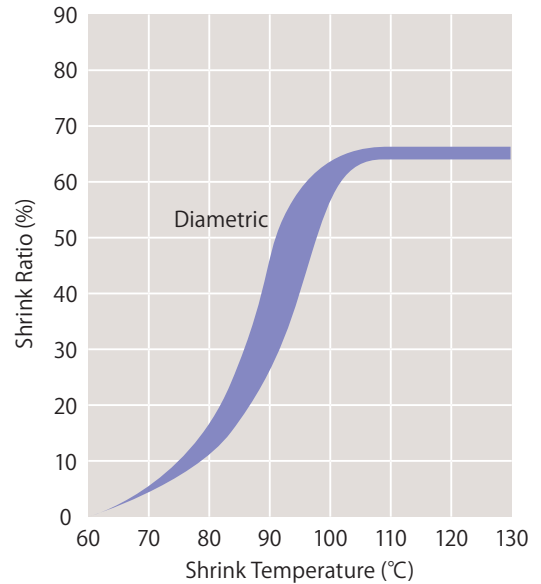
Specifications/Approvals

- SAE-AS23053/4 Class 3
UL224
File No. E75077
Catalog No. SUMITUBE™ W3B2 or 891
Rating temperature: 125°C Rating voltage: 600V
CSA C22.2 No. 198.1
File No. LR33298
Rating temperature: 125°C Rating voltage: 600V

Colors

- Black

Shrink Properties



Applications

- Waterproof sealing for electronic devices with irregular shapes or profiles
- Encapsulation for wire branches
- Insulation and protection for wire joints

Properties [SAE-AS23053/4 Class 3]

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------|--|------------------------------|
| Mechanical | Tensile strength*2 | min. 10.4MPa | 14.4MPa |
| | Elongation | min. 250% | 472% |
| | Cold impact | -55°C x 3 minutes, no crack | Pass |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 11.8kV/mm | 41.1kV/mm |
| | Volume resistivity | min. 10 ¹⁴ Ω·cm | 2.11 x 10 ¹⁵ Ω·cm |
| Chemical | Water absorption | 23°C x 24 hours, max. 1.0% | 0.49% |
| | Corrosion against bare copper | 121°C x 16 hours, no corrosion | Pass |
| | Color stability | 175°C x 24 hours, no change | Pass |
| | Fluid Resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | |
| | Tensile strength | min. 6.2MPa | 10.4MPa |
| | Dielectric strength | min. 7.9kV/mm | 38.1kV/mm |
| | Flammability (UL224) | Flame-retarded, pass, all tubing flame test | Pass |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|-----------------|------------------------|------------------------|----------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Inside diameter (max.) | Wall thickness*3 | Adhesive thickness (nom.) | |
| 3/1 | 3.00 | 1.00 | 1.00 ± 0.30 | 0.50 | 1.22 |
| 6/2 | 6.1 | 2.00 | 1.00 ± 0.30 | 0.50 | 1.22 |
| 12/4 | 11.9 | 4.10 | 1.80 ± 0.40 | 0.80 | 1.22 |
| 24/8 | 23.9 | 8.1 | 2.50 ± 0.50 | 1.00 | 1.22 |
| 40/13 | 39.9 | 13.0 | 2.50 ± 0.50 | 1.00 | 1.22 |

*3: Including inner adhesive

IRRAX™TUBE IRRAX™TAPE

- A
- B
- F2
- F2 (UL)
- V2
- RP3
- B8
- ER2
- NHR
- FE2
- VZL

IRRAX™SLEEVE

- SCM2
- SBI 300/350
- SNHM

Composite articles

- SUMISEAL
- SUMITUBE SA3 CAP

Processing equipment

- SUMISHRINKER / HEATING GUN

SUMITUBE™ W3B2 (4X)

[Dual wall, flame-retarded heat-shrinkable tubing with meltable adhesive for waterproofing of irregular-shaped objects]
SAE/UL recognized

Catalog No. 891 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Outer : Irradiated cross-linked flexible flame-retarded polyolefin
: Inner : Meltable adhesive
- Shrink temperature : min. 110°C
- Shrink ratio : Radial change : min. 80%
: Longitudinal change: -15 to 5%
- Continuous operating temperature : -55 to 125°C

Features

- SAE/UL recognized
- Watertight sealing with good adhesion to metals, polyolefin and PVC
- Flame-retarded (PBDE/PBB-free)
- Flexible
- Thicker adhesive (than SUMITUBE™ O2B2)

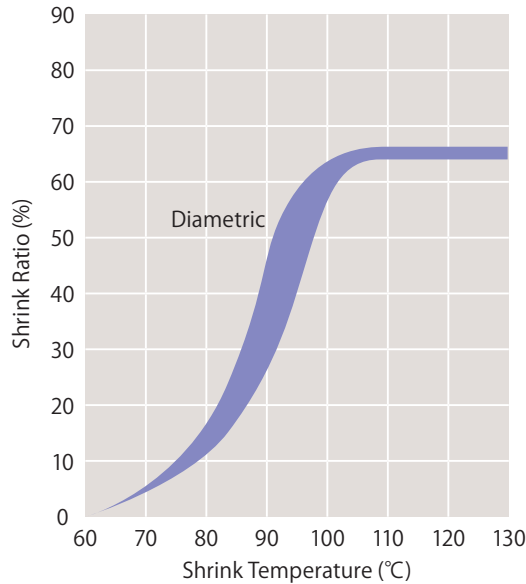
Specifications/Approvals

- SAE-AS23053/4 Class 3
UL224
File No. E75077
Catalog No. SUMITUBE™ W3B2 (4X) or 891
Rating temperature: 125°C
Rating voltage: 600V

Colors

- Black

Shrink Properties



Applications

- Waterproof sealing for electronic devices with irregular shapes or profiles
- Encapsulation for wire branches
- Insulation and protection for wire joints

Properties [SAE-AS23053/4 Class3]

| Properties | Items | Requirements | Typical values*1 |
|----------------------|---|--|------------------------------|
| Mechanical | Tensile strength*2 | min. 10.4MPa | 14.4MPa |
| | Elongation | min. 250% | 472% |
| | Cold impact | -55°C x 3 minutes, no crack | Pass |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 11.8kV/mm | 41.1kV/mm |
| | Volume resistivity | min. 10 ¹⁴ Ω·cm | 2.11 x 10 ¹⁵ Ω·cm |
| Chemical | Water absorption | 23°C x 24 hours, max. 1.0% | 0.49% |
| | Corrosion against bare copper | 121°C x 16 hours, no corrosion | Pass |
| | Color stability | 175°C x 24 hours, no change | Pass |
| | Fluid Resistance | After immersion in the fluids specified in SAE-AS23053 at 23°C for 24 hours, | Pass |
| | Tensile strength | min. 6.2MPa | 10.4MPa |
| Dielectric strength | min. 7.9kV/mm | 38.1kV/mm | |
| Flammability (UL224) | Flame-retarded, pass, all tubing flame test | Pass | |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (mm) | As supplied (mm) | After recovered (mm) | | | Unit length (min.) (m) |
|-----------------|------------------------|------------------------|-------------------------|---------------------------|------------------------|
| | Inside diameter (min.) | Inside diameter (max.) | Wall thickness*3 (nom.) | Adhesive thickness (nom.) | |
| 4/1 | 4.00 | 1.00 | 1.00 ± 0.30 | 0.50 | 1.22 |
| 8/2 | 8.0 | 2.00 | 1.00 ± 0.30 | 0.50 | 1.22 |
| 16/4 | 16.0 | 4.00 | 1.80 ± 0.40 | 0.80 | 1.22 |
| 24/6 | 24.0 | 6.0 | 2.50 ± 0.50 | 1.00 | 1.22 |

*3: Including inner adhesive

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
| KH230 (TW) |

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™ SA2

[Dual wall, highly water/heat resistant, high shrink ratio flame-retarded heat-shrinkable tubing with meltable adhesive]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



| |
|------------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |
| K |
| K2 |
| KH200 (TW) |
| KH230 (TW) |
| B6 |
| R |
| AN25 |
| W |
| O2C |
| W3C |
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE
IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

Basic Properties

- Material : Outer : Irradiated cross-linked semi-rigid flame-retarded polyolefin
- : Inner : Meltable adhesive
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: min. 75%
- : Longitudinal change : min. -10%
- Continuous operating temperature : -40 to 130°C

Features

- Watertight sealing with excellent adhesion to automotive grade wire insulations
- High shrink ratio and effective for waterproofing of irregular-shaped objects
- Effective for sealing of single or multi-wire splices
- Flame-retarded (outer jacket only)
- Abrasion resistant

Specifications/Approvals

SFP standard (RE4-B100)

Marking on Surface

See size table

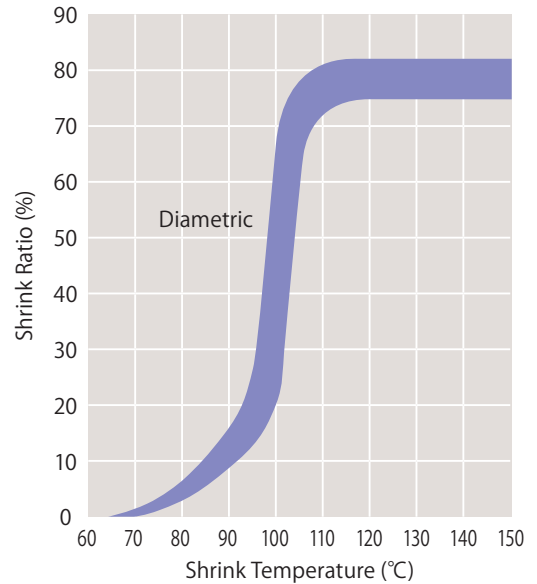
Applications

- Waterproof sealing, insulation and reinforcement for harness joints of motor vehicles/electronic devices
- Waterproof sealing of irregular-shaped components or devices used in automotive environments

Colors

- Black

Shrink Properties



Properties

| Properties | Items | Requirements | Typical values*1 |
|--|----------------------------------|---|-----------------------------|
| Mechanical | Tensile strength*2 | min. 10.4MPa | 31.7MPa |
| | Elongation | min. 300% | 558% |
| | Heat shock | 225°C x 4 hours, no crack | Pass |
| | Heat resistance | 130°C x 7 days, no crack | Pass |
| | Secant modulus | min. 150MPa | 200.8MPa |
| Electrical | Dielectric strength | min. 19.7kV/mm | 22.7kV/mm |
| | Volume resistivity | min. 1.0 x 10 ¹² Ω·cm | 1.2 x 10 ¹⁶ Ω·cm |
| Chemical | Flammability | SAE J1128, self-extinguish within 70 sec. | Pass |
| Splice performance (on representative splice configurations) | Testing to SFP internal standard | | |
| | •Heat aging: | 125°C x 1008 hours | Pass |
| | •Heat cycle: | 125 cycles, 125°C (30 minutes) to -40°C (30 minutes) | Pass |
| | •Fluid resistance: | 2-hour immersion in: brake fluid, engine coolant, ASTM Reference Oil #3, automatic transmission fluid | Pass |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) | Marking |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|---------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (min.) | Adhesive thickness (nom.) | | |
| 5.8/1.2 | 5.80 | 0.45 | 1.26 | 1.20 | 0.56 | 1.22 | SA2-1 |
| 7.5/1.6 | 7.5 | 0.60 | 1.64 | 1.52 | 0.76 | 1.22 | SA2-2 |
| 10.9/2.4 | 10.9 | 0.70 | 2.40 | 1.91 | 1.02 | 1.22 | SA2-3 |
| 17.8/4.4 | 17.8 | 0.80 | 4.45 | 2.41 | 1.37 | 1.22 | SA2-4 |

*3: Including inner adhesive

SUMITUBE™ SA3

[Dual wall, flame-retarded heat-shrinkable tubing with meltable adhesive for harness joints of motor vehicles]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material : Outer : Irradiated cross-linked semi-rigid flame-retarded polyolefin
: Inner : Meltable adhesive
- Shrink temperature : min. 135°C
- Shrink ratio : Radial change : min. 75%
: Longitudinal change : min. -10%
- Continuous operating temperature : -40 to 130°C

Features

- High shrink ratio and effective for waterproofing of multiple harness joints and splices
- Recovered tube remains in position at elevated temperatures
- Flame-retarded (PBDE/PBB-free)
- Abrasion resistant

Specifications/Approvals

SFP standard (RE4-F307)

Marking on Surface

See size table

Applications

- Waterproof sealing, insulation and reinforcement for harness joints of motor vehicles/electronic devices
- Waterproof sealing of irregular-shaped components or devices used in automotive environments

Colors

- Black

Properties

| Properties | Items | Requirements | Typical values*1 |
|--|----------------------------------|---|---|
| Mechanical | Tensile strength*2 | min. 10.4MPa | 25.8MPa |
| | Elongation | min. 300% | 550% |
| | Heat shock | 225°C x 4 hours, no crack | Pass |
| | Heat resistance | 130°C x 7 days, no crack | Pass |
| | Secant modulus | min. 150MPa | 463MPa |
| Electrical | Dielectric strength | min. 15kV/mm | 20.6kV/mm |
| | Volume resistivity | min. $1.0 \times 10^{12} \Omega \cdot \text{cm}$ | $9.6 \times 10^{13} \Omega \cdot \text{cm}$ |
| Chemical | Flammability | SAE J1128, self-extinguish within 70 sec. | Pass |
| Splice performance (on representative splice configurations) | Testing to SFP internal standard | | |
| | •Heat aging: | 125°C x 1008 hours | Pass |
| | •Heat cycle: | 125 cycles, 125°C (30 minutes) to -40°C (30 minutes) | Pass |
| | •Fluid resistance: | 2-hour immersion in: brake fluid, engine coolant, ASTM Reference Oil #3, automatic transmission fluid | Pass |

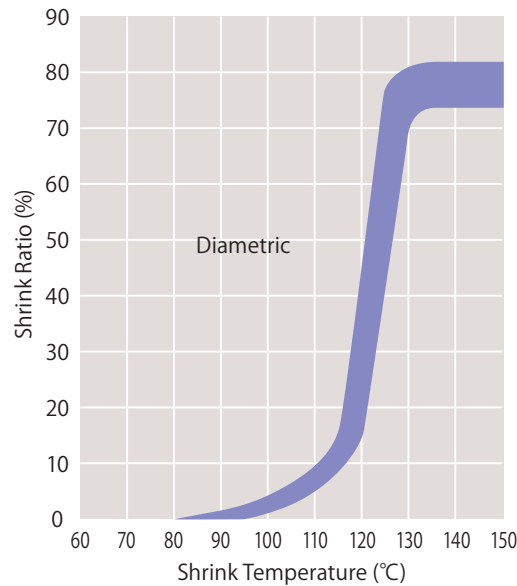
*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) | Marking |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|---------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (min.) | Adhesive thickness (nom.) | | |
| 5.8/1.2 | 5.80 | 0.45 | 1.26 | 1.20 | 0.56 | 1.22 | SA3-1 |
| 7.5/1.6 | 7.5 | 0.60 | 1.64 | 1.52 | 0.76 | 1.22 | SA3-2 |
| 10.9/2.4 | 10.9 | 0.70 | 2.40 | 1.91 | 1.02 | 1.22 | SA3-3 |
| 17.8/4.4 | 17.8 | 0.80 | 4.45 | 2.41 | 1.37 | 1.22 | SA3-4 |

*3: Including inner adhesive

Shrink Properties



SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN



IRRAX™TUBE & IRRAX™TAPE

IRRAXTUBE is a heat-resistant tube that takes advantage of heat/chemical resistance of a plastic enhanced by electron beam irradiation. Made mainly from raw materials such as polyolefin, fluorinated polymer, or thermoplastic elastomer, IRRAXTUBE is widely used in various industrial fields for thermal protection, mechanical protection, and chemical protection of electrical wires and harnesses and for various other purposes.

IRRAX™TUBE/IRRAX™TAPE

| | |
|-----------|---------|
| IRRAXTUBE | A |
| | B |
| | F2 |
| | F2 (UL) |
| | V2 |
| | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRAXTAPE | VZL |



IRRAX™ TUBE A

[Heat-resistant tubing]

Catalog No. 801 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Cross-linked flexible polyolefin
- Continuous operating temperature: -55 to 105°C

Features

- Excellent oil and chemical resistance
- Transparent colors

Specifications/Approvals

SFP standard (RE1-0280)

Applications

- Insulation and protection of lead wires of resistors and capacitors
- Protection of lead wires and parts which are subject to high temperature
- Insulation of lead wires for wiring of AV, OA, telecommunication equipment, and measuring instruments

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White, Clear

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 19.2MPa |
| | Elongation | min. 200% | 440% |
| | Specific gravity | — | 0.92 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.6 \times 10^{14} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.10% | 0.09% |
| | Flammability | Flammable | — |

*1: For reference use only

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|-----------------|----------------------|---------------------|-----------------|
| 0.4 × 0.25 | 0.40 ± 0.05 | 0.25 ± 0.05 | 1,000 min. |
| 0.7 × 0.25 | 0.70 ± 0.10 | 0.25 ± 0.05 | 1,000 min. |
| 1 × 0.3 | 1.00 ± 0.10 | 0.30 ± 0.05 | 500 min. |
| 1.5 × 0.3 | 1.50 ± 0.10 | 0.30 ± 0.05 | 400 min. |
| 2 × 0.3 | 2.00 ± 0.20 | 0.30 ± 0.05 | 300 min. |
| 3 × 0.3 | 3.00 ± 0.20 | 0.30 ± 0.05 | 400 min. |
| 4 × 0.3 | 4.00 ± 0.30 | 0.30 ± 0.05 | 400 min. |
| 5 × 0.3 | 5.00 ± 0.30 | 0.30 ± 0.05 | 200 min. |
| 6 × 0.3 | 6.0 ± 0.5 | 0.30 ± 0.05 | 200 min. |
| 8 × 0.4 | 8.0 ± 0.5 | 0.40 ± 0.05 | 100 min. |
| 10 × 0.4 | 10.0 ± 0.5 | 0.40 ± 0.05 | 100 min. |

Longitudinal change: min. -20% (125°C x 1 minute)

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™ SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™

IRRAX™ TUBE B

[Heat-resistant, flame-retarded tubing]

Catalog No. 829 ✓ RoHS directive 10 substances

Waterproofing

Flame-retarded

UL recognized

CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Continuous operating temperature: -45 to 120°C

Features

- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

SFP standard (RE1-0380)

Applications

- Insulation and heat protection of wire harnesses and parts for automobiles
- Protection of aircraft wiring where flame retardance is required
- Protection of lead wires and parts which are subject to high temperature

Colors

- Standard colors: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, White (all colors are in pastel tone)

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength | min. 10.4MPa | 18.6MPa |
| | Elongation | min. 200% | 450% |
| | Specific gravity | — | 1.03 |
| | Hardness (Shore D) | — | 42 |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.1 \times 10^{17} \Omega \cdot \text{cm}$ |
| Chemical | Water absorption | 23°C x 24 hours, max. 0.30% | 0.15% |
| | Flammability | Flame-retarded (by FMVSS method*2) | Pass |

*1: For reference use only *2: FMVSS = Federal Motor Vehicle Safety Standard (regulation in the U.S.A)

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|-----------------|----------------------|---------------------|-----------------|
| 0.7 × 0.35 | 0.70 ± 0.10 | 0.35 ± 0.05 | 1,000 min. |
| 1 × 0.35 | 1.00 ± 0.10 | 0.35 ± 0.05 | 500 min. |
| 1.5 × 0.35 | 1.50 ± 0.10 | 0.35 ± 0.05 | 400 min. |
| 2 × 0.35 | 2.00 ± 0.20 | 0.35 ± 0.05 | 200 min. |
| 3 × 0.35 | 3.00 ± 0.20 | 0.35 ± 0.05 | 400 min. |
| 4 × 0.35 | 4.00 ± 0.30 | 0.35 ± 0.05 | 400 min. |
| 5 × 0.35 | 5.00 ± 0.30 | 0.35 ± 0.05 | 200 min. |
| 6 × 0.35 | 6.0 ± 0.5 | 0.35 ± 0.05 | 200 min. |
| 8 × 0.4 | 8.0 ± 0.5 | 0.40 ± 0.05 | 100 min. |
| 10 × 0.4 | 10.0 ± 0.5 | 0.40 ± 0.05 | 100 min. |
| 12 × 0.4 | 12.0 ± 0.5 | 0.40 ± 0.05 | 100 min. |
| 14 × 0.5 | 14.0 ± 0.5 | 0.50 ± 0.05 | 100 min. |

Longitudinal change: min. -20% (125°C x 1 minute)

| |
|------------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |
| K |
| K2 |
| KH200 (TW) |
| KH230 (TW) |
| B6 |
| R |
| AN25 |
| W |
| O2C |
| W3C |
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE
IRRAX™ TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™ SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

IRRAX™ TUBE F2

[Flexible heat-resistant tubing compliant with Electrical Appliance and Material Safety Law]

Catalog No. 901 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



IRRAX™ TUBE F2 is made of the same materials as IRRAX™ TUBE F2 (UL). (Both products are compliant with the UL224 standard and the Electrical Appliance and Material Safety Law.) The description of the markings, colors, and sizes are shown below.

Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Continuous operating temperature: -55 to 125°C

Features

- Flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

Electrical Appliance and Material Safety Law (Japan)
 Operating temperature 125°C (provisional registration)
 (Registration No.: 004CC0176)
 Registration of flammability rating (-F-)
 (Registration No.: F-ST53-009 to F-ST53-016)

Marking on Surface

◆ SUMITOMO IRRAX F2 125°C -F-

Applications

- Insulation, protection and reinforcement of terminations and joints of electric wires
- Identification and bundling of electric wires

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White

Properties

| Properties | Items | Requirements | Typical values* |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 12.1MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 11.7MPa |
| | Elongation (before aging) | min. 200% | 300% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 325% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| | Cold bend | -30°C x 1 hour, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 19.7kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| Chemical | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $1.3 \times 10^{16} \Omega \cdot \text{cm}$ |
| | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 350% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*: For reference use only

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|-----------------|----------------------|---------------------|-----------------|
| 1 × 0.4 | 1.00 ± 0.10 | 0.40 min. | 500 min. |
| 1.5 × 0.4 | 1.50 ± 0.10 | 0.40 min. | 300 min. |
| 2 × 0.4 | 2.00 ± 0.20 | 0.40 min. | 200 min. |
| 3 × 0.4 | 3.00 ± 0.20 | 0.40 min. | 400 min. |
| 4 × 0.4 | 4.00 ± 0.30 | 0.40 min. | 400 min. |
| 5 × 0.4 | 5.00 ± 0.30 | 0.40 min. | 200 min. |
| 6 × 0.4 | 6.0 ± 0.5 | 0.40 min. | 200 min. |
| 7 × 0.4 | 7.0 ± 0.5 | 0.40 min. | 100 min. |
| 8 × 0.4 | 8.0 ± 0.5 | 0.40 min. | 100 min. |
| 9 × 0.4 | 9.0 ± 0.5 | 0.40 min. | 100 min. |
| 10 × 0.4 | 10.0 ± 0.5 | 0.40 min. | 100 min. |

Longitudinal change: min. -20% (125°C x 1 minute)

SUMITUBE™

| | |
|----------|--------|
| | A |
| | C |
| | A4 |
| SUMITUBE | LA |
| | C (UL) |
| | D |
| | A2 |

| | |
|----------|----|
| SUMITUBE | B |
| | LB |

| | |
|----------|----------|
| | F (Z) |
| | F3 (Z) |
| SUMITUBE | NHR2 |
| | NHR4 |
| | V (300V) |
| | V (600V) |

| | |
|----------|---------|
| | F2 (Z) |
| | F4 (Z) |
| SUMITUBE | B2 |
| | B2 (3X) |
| | B8 |

| | |
|----------|----|
| SUMITUBE | K |
| | K2 |

| | |
|----------|------------|
| SUMITUBE | KH200 (TW) |
|----------|------------|

| | |
|----------|------------|
| SUMITUBE | KH230 (TW) |
|----------|------------|

| | |
|----------|------|
| | B6 |
| SUMITUBE | R |
| | AN25 |

| | |
|----------|---|
| SUMITUBE | W |
|----------|---|

| | |
|----------|-----|
| SUMITUBE | O2C |
| | W3C |

| | |
|----------|-----------|
| | O2B2 |
| | W3F2 |
| SUMITUBE | W3B2 |
| | W3B2 (4X) |
| | SA2 |
| | SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| | |
|------------|---------|
| | A |
| | B |
| | F2 |
| | F2 (UL) |
| | V2 |
| IRRAX TUBE | RP3 |
| | B8 |
| | ER2 |
| | NHR |
| | FE2 |
| IRRAX TAPE | VZL |

IRRAX™ SLEEVE

| | |
|--------------|-------------|
| | SCM2 |
| IRRAX SLEEVE | SBI 300/350 |
| | SNHM |

Composite articles

| | |
|------------------|--|
| SUMISEAL | |
| SUMITUBE SA3 CAP | |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™

A

C

A4

SUMITUBE

LA

C (UL)

D

A2

SUMITUBE

B

LB

F (Z)

F3 (Z)

SUMITUBE

NHR2

NHR4

V (300V)

V (600V)

F2 (Z)

F4 (Z)

SUMITUBE

B2

B2 (3X)

B8

SUMITUBE

K

K2

SUMITUBE

KH200 (TW)

SUMITUBE

KH230 (TW)

B6

SUMITUBE

R

AN25

SUMITUBE

W

SUMITUBE

O2C

W3C

SUMITUBE

O2B2

W3F2

SUMITUBE

W3B2

SUMITUBE

W3B2 (4X)

SA2

SA3

IRRAX™TUBE
IRRAX™TAPE

A

B

F2

F2 (UL)

V2

IRRAXTUBE

RP3

B8

ER2

NHR

FE2

IRRAXTAPE

VZL

IRRAX™SLEEVE

SCM2

IRRAXSLEEVE

SBI 300/350

SNHM

Composite
articles

SUMISEAL

SUMITUBE SA3 CAP

Processing
equipment

SUMISHRINKER / HEATING GUN

IRRAX™TUBE F2 (UL)

[Flexible heat-resistant tubing compliant with Electrical Appliance and Material Safety Law] UL recognized

Catalog No. 715, 845 ✓ RoHS directive 10 substances

Waterproofing

Flame-retarded

UL recognized

CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Continuous operating temperature: -55 to 125°C

Features

- Flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224 For sizes AWG24 to AWG18 (Catalog No. 715)

File No.: E70631

Flammability rating: VW-1

UL224 For sizes bigger than AWG17 (Catalog No. 845)

File No.: E75077

Operating temperature: 125°C

Voltage rating: 600V

Flammability rating: VW-1

Electrical Appliance and Material Safety Law (Japan)

Operating temperature 125°C (provisional registration)

(Registration No.: 004CC0176)

Registration of flammability rating (-F-)

(Registration No.: F-ST53-009 to F-ST53-016)

Marking on Surface

For sizes AWG24 to AWG18 (Catalog No. 715)

❖VW-1 SUMITOMO IRRAXTUBE F2 -F-

For sizes bigger than AWG17 (Catalog No. 845)

❖VW-1 SUMITOMO IRRAXTUBE F2 125°C -F-

Applications

- Insulation, protection and reinforcement of terminations and joints of electric wires
- Identification and bundling of electric wires

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White

Properties

| Properties | Items | Requirements | Typical values* |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 13.2MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 7.3MPa | 13.4MPa |
| | Elongation (before aging) | min. 200% | 325% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 350% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| | Cold bend | -30°C x 1 hour, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 19.1kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹⁴ Ω·cm | 1.6 x 10 ¹⁶ Ω·cm |
| Chemical | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 325% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*: For reference use only

Sizes

| Trade size | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) | Nominal size | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|------------|----------------------|---------------------|-----------------|--------------|----------------------|---------------------|-----------------|
| AWG24 | 0.55±0.10 | 0.50±0.06 | 500 min. | AWG10 | 2.60±0.15 | 0.62±0.06 | 400 min. |
| AWG22 | 0.65±0.10 | 0.50±0.06 | 500 min. | AWG 9 | 2.90±0.15 | 0.62±0.06 | 400 min. |
| AWG20 | 0.80±0.10 | 0.50±0.06 | 500 min. | AWG 8 | 3.30±0.15 | 0.62±0.06 | 400 min. |
| AWG19 | 0.90±0.10 | 0.50±0.06 | 500 min. | AWG 7 | 3.70±0.15 | 0.62±0.06 | 400 min. |
| AWG18 | 1.00±0.10 | 0.50±0.06 | 250 min. | AWG 6 | 4.10±0.20 | 0.62±0.06 | 200 min. |
| AWG17 | 1.15±0.10 | 0.62±0.06 | 250 min. | AWG 5 | 4.60±0.20 | 0.62±0.06 | 200 min. |
| AWG16 | 1.30±0.10 | 0.62±0.06 | 250 min. | AWG 4 | 5.20±0.20 | 0.62±0.06 | 200 min. |
| AWG15 | 1.45±0.10 | 0.62±0.06 | 200 min. | AWG 3 | 5.80±0.20 | 0.62±0.06 | 100 min. |
| AWG14 | 1.65±0.10 | 0.62±0.06 | 200 min. | AWG 2 | 6.5 ±0.2 | 0.62±0.06 | 100 min. |
| AWG13 | 1.80±0.15 | 0.62±0.06 | 200 min. | AWG 1 | 7.3 ±0.3 | 0.62±0.06 | 100 min. |
| AWG12 | 2.10±0.15 | 0.62±0.06 | 400 min. | AWG 0 | 8.3 ±0.3 | 0.62±0.06 | 100 min. |
| AWG11 | 2.30±0.15 | 0.62±0.06 | 400 min. | | | | |

Longitudinal change: min. -20% (125°C x 1 minute)

IRRAX™ TUBE V2

[Heat-resistant tubing] UL and CSA recognized

Catalog No. 806, 807, 837, 834

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Flexible flame-retarded polyvinyl chloride
- Continuous operating temperature: -30 to 105°C

Features

- Flame-retarded

Specifications/Approvals

Colored :
UL224

File No.: E48762 Operating temperature: 105°C
Voltage rating: 300V or 600V Flammability rating: VW-1

Clear :

Electrical Appliance and Material Safety Law (Japan)
Registration of flammability rating (-F-)
(Registration No.: F-STS3-001 to F-STS3-008)

CSA C22.2 No.198.1

File No.: LR33298 Operating temperature: 105°C
Voltage rating: 300V or 600V Flammability rating: VW-1

Note: Operating voltage and colors differ according to
Catalog No., see table to right.

Marking on Surface

Colored : 105°C vw-1 SUMITOMO-K IRRAX™ TUBE V2 CAT XXX CSA 105°C VW1-F-

Clear : us 105°C vw1 SUMITOMO-K IRRAX™ TUBE V2 CAT XXX-F-
(XXX : Colors : 806or807, clear : 837or834)

Applications

- Insulation, protection and reinforcement of terminations and joints of electric wires
- Identification and bundling of electric wires

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White, Clear

| Catalog No. | Operating temperature | Operating voltage | Colors |
|-------------|-----------------------|-------------------|---------|
| 806 | 105°C | 300V | Colored |
| 807 | 105°C | 600V | Colored |
| 837 | 105°C | 300V | Clear |
| 834 | 105°C | 600V | Clear |

Properties

| Properties | Items | Requirements | Typical values* |
|------------|--|---|---|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 28.6MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 29.0MPa |
| | Elongation (before aging) | min. 100% | 310% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 320% |
| | Deformation | 131°C x 1 hour, max. 35% | 25% |
| | Heat shock | 180°C x 4 hours, no crack | Pass |
| Electrical | Cold bend | -30°C x 1 hour, no crack | Pass |
| | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | Pass |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original | Pass |
| Chemical | Volume resistivity | min. $1.0 \times 10^{10} \Omega \cdot \text{cm}$ | $4.8 \times 10^{12} \Omega \cdot \text{cm}$ |
| | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper Flammability | 136°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours Flame-retarded, pass VW-1 | 190% Pass |

*: For reference use only

Sizes

| Catalog No. 806, 816 (300V, Colored and Clear) | | | | Catalog No. 807, 817 (600V, Colored and Clear) | | | |
|--|----------------------|---------------------|-----------------|--|----------------------|---------------------|-----------------|
| Trade size | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) | Trade size | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
| AWG24 | 0.55±0.10 | 0.32±0.06 | 1,000 min. | AWG24 | 0.55±0.10 | 0.50±0.06 | 500 min. |
| AWG22 | 0.65±0.10 | 0.32±0.06 | 500 min. | AWG22 | 0.65±0.10 | 0.50±0.06 | 500 min. |
| AWG20 | 0.80±0.10 | 0.40±0.06 | 500 min. | AWG20 | 0.80±0.10 | 0.50±0.06 | 500 min. |
| AWG19 | 0.90±0.10 | 0.40±0.06 | 500 min. | AWG19 | 0.90±0.10 | 0.50±0.06 | 500 min. |
| AWG18 | 1.00±0.10 | 0.40±0.06 | 500 min. | AWG18 | 1.00±0.10 | 0.50±0.06 | 250 min. |
| AWG17 | 1.15±0.10 | 0.40±0.06 | 250 min. | AWG17 | 1.15±0.10 | 0.62±0.06 | 250 min. |
| AWG16 | 1.30±0.10 | 0.40±0.06 | 250 min. | AWG16 | 1.30±0.10 | 0.62±0.06 | 250 min. |
| AWG15 | 1.45±0.10 | 0.40±0.06 | 200 min. | AWG15 | 1.45±0.10 | 0.62±0.06 | 200 min. |
| AWG14 | 1.65±0.10 | 0.40±0.06 | 200 min. | AWG14 | 1.65±0.10 | 0.62±0.06 | 200 min. |
| AWG13 | 1.80±0.15 | 0.40±0.06 | 200 min. | AWG13 | 1.80±0.15 | 0.62±0.06 | 200 min. |
| AWG12 | 2.10±0.15 | 0.40±0.06 | 400 min. | AWG12 | 2.10±0.15 | 0.62±0.06 | 400 min. |
| AWG11 | 2.30±0.15 | 0.40±0.06 | 400 min. | AWG11 | 2.30±0.15 | 0.62±0.06 | 400 min. |
| AWG10 | 2.60±0.15 | 0.40±0.06 | 400 min. | AWG10 | 2.60±0.15 | 0.62±0.06 | 400 min. |
| AWG 9 | 2.90±0.15 | 0.50±0.06 | 400 min. | AWG 9 | 2.90±0.15 | 0.62±0.06 | 400 min. |
| AWG 8 | 3.30±0.15 | 0.50±0.06 | 400 min. | AWG 8 | 3.30±0.15 | 0.62±0.06 | 400 min. |
| AWG 7 | 3.70±0.15 | 0.50±0.06 | 400 min. | AWG 7 | 3.70±0.15 | 0.62±0.06 | 400 min. |
| AWG 6 | 4.10±0.20 | 0.50±0.06 | 200 min. | | | | |
| AWG 5 | 4.60±0.20 | 0.50±0.06 | 200 min. | | | | |
| AWG 4 | 5.20±0.20 | 0.50±0.06 | 200 min. | | | | |
| AWG 3 | 5.80±0.20 | 0.50±0.06 | 100 min. | | | | |
| AWG 2 | 6.5 ±0.2 | 0.50±0.06 | 100 min. | | | | |
| AWG 1 | 7.3 ±0.3 | 0.50±0.06 | 100 min. | | | | |
| AWG 0 | 8.3 ±0.3 | 0.50±0.06 | 100 min. | | | | |

Longitudinal change: 0±5% (100°C x 2 hours)

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|------|
| O2B2 |
|------|

| |
|------|
| W3F2 |
|------|

| |
|-----------|
| W3B2 |
| W3B2 (4X) |

| |
|-----|
| SA2 |
| SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |

| |
|----|
| V2 |
|----|

| |
|-----|
| RP3 |
|-----|

| |
|-----|
| B8 |
| ER2 |

| |
|-----|
| NHR |
| FE2 |

| |
|-----|
| VZL |
|-----|

IRRAX™ SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

| |
|----------------------------|
| SUMISHRINKER / HEATING GUN |
|----------------------------|

SUMITUBE™

IRRAX™ TUBE RP3

[Very flexible heat-resistant tubing] UL recognized

Catalog No. 702 ✓ RoHS directive 10 substances

Waterproofing

Flame-retarded

UL recognized

CSA recognized



Basic Properties

- Material: Cross-linked very flexible flame-retarded polyolefin
- Continuous operating temperature: -55 to 105°C

Features

- Very flexible
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224

File No.: E75077

Operating temperature: 105°C

Voltage rating: 300V

Flammability rating: VW-1

Electrical Appliance and Material Safety Law (Japan)

Registration of flammability rating (-F-)

(Registration No.: F-ST53-009 to F-ST53-016)

Marking on Surface

UL 105 VW-1 SUMITOMO-K IRRAX™ TUBE RP3 -F-

UL indicates UL logotype.

Applications

- Insulation, protection and reinforcement of terminations and joints of electric wires
- Identification and bundling of electric wires

Colors

- Black

Properties

| Properties | Items | Requirements | Typical values* |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 10.4MPa | 12.5MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 7.3MPa | 12.8MPa |
| | Elongation (before aging) | min. 200% | 425% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 450% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| | Cold bend | -30°C x 1 hour, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 136°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 16.4kV |
| | Dielectric breakdown (after aging) | 136°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $3.0 \times 10^{14} \Omega \cdot \text{cm}$ |
| Chemical | Corrosion against bare copper | 136°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 136°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 425% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*: For reference use only

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|-----------------|----------------------|---------------------|-----------------|
| 3 × 0.5 | 3.00 ± 0.15 | 0.50 ± 0.06 | 400 min. |
| 4 × 0.5 | 4.00 ± 0.20 | 0.50 ± 0.06 | 200 min. |
| 5 × 0.5 | 5.00 ± 0.20 | 0.50 ± 0.06 | 200 min. |
| 6 × 0.5 | 6.0 ± 0.2 | 0.50 ± 0.06 | 100 min. |
| 7 × 0.5 | 7.0 ± 0.3 | 0.50 ± 0.06 | 100 min. |
| 8 × 0.5 | 8.0 ± 0.3 | 0.50 ± 0.06 | 100 min. |
| 9 × 0.5 | 9.0 ± 0.3 | 0.50 ± 0.06 | 100 min. |
| 10 × 0.5 | 10.0 ± 0.4 | 0.50 ± 0.06 | 100 min. |
| 12 × 0.5 | 12.0 ± 0.4 | 0.50 ± 0.06 | 100 min. |

Longitudinal change: 0 ± 5%

IRRAX™ TUBE
IRRAX™ TAPE

| |
|----------------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAX TAPE VZL |

IRRAX™ SLEEVE

| |
|--------------------------|
| SCM2 |
| IRRAX SLEEVE SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

IRRAX™ TUBE B8

[Semi-rigid heat-resistant tubing compliant with Electrical Appliance and Material Safety Law] UL recognized

Catalog No. 838, 897  RoHS directive 10 substances

 Waterproofing  Flame-retarded  UL recognized  CSA recognized



Basic Properties

- Material: Cross-linked semi-rigid flame-retarded polyolefin
- Continuous operating temperature: -55 to 125°C

Features

- Semi-rigid
- Flame-retarded (PBDE/PBB-free)

Specifications/Approvals

UL224 (for Catalog No. 838)

File No.: E75077

Operating temperature: 125°C

Voltage rating: 600V

Flammability rating: VW-1

Electrical Appliance and Material Safety Law (Japan)

(for Catalog No. 838, 897)

Registration of flammability rating (-F-)

(Registration No.: STS3-009 to STS3-016)

Marking on Surface

- ❖ VW-1 SUMITOMO IRRAX™ TUBE B8 125-F- (for Catalog No. 838)
- ❖ SUMITOMO IRRAX™ TUBE B8 -F- (for Catalog No. 897)

Applications

- Insulation and protection of electric terminations where mechanical strength is required
- Reinforcement of objects to be covered

Colors

- Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White

Properties

| Properties | Items | Requirements | Typical values* |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 13.8MPa | 19.0MPa |
| | Tensile strength (after aging) | 158°C x 7 days, min. 9.7MPa | 17.1MPa |
| | Elongation (before aging) | min. 200% | 340% |
| | Elongation (after aging) | 158°C x 7 days, min. 100% | 340% |
| | Heat shock Cold bend | 250°C x 4 hours, no crack -30°C x 1 hour, no crack | Pass Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 158°C x 7 days, AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric breakdown (before aging) | min. AC2.5kV | 15.0kV |
| | Dielectric breakdown (after aging) | 158°C x 7 days, min. 50% of original and min. AC2.5kV | Pass |
| | Volume resistivity | min. $1.0 \times 10^{14} \Omega \cdot \text{cm}$ | $2.3 \times 10^{16} \Omega \cdot \text{cm}$ |
| Chemical | Corrosion against bare copper | 158°C x 7 days, no corrosion after leaving under 95% humidity, 23°C x 24 hours | Pass |
| | Stability against copper | 158°C x 7 days, elongation min. 100% after leaving under 95% humidity, 23°C x 24 hours | 304% |
| | Flammability | Flame-retarded, pass VW-1 | Pass |

*: For reference use only

Sizes

| Catalog No. 838 | | | |
|-----------------|----------------------|---------------------|-----------------|
| Trade size | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
| AWG24 | 0.55 ± 0.10 | 0.50 ± 0.06 | 500 min. |
| AWG22 | 0.65 ± 0.10 | 0.50 ± 0.06 | 500 min. |
| AWG20 | 0.80 ± 0.10 | 0.50 ± 0.06 | 500 min. |
| AWG19 | 0.90 ± 0.10 | 0.50 ± 0.06 | 500 min. |
| AWG18 | 1.00 ± 0.10 | 0.50 ± 0.06 | 250 min. |
| AWG17 | 1.15 ± 0.10 | 0.62 ± 0.06 | 250 min. |
| AWG16 | 1.30 ± 0.10 | 0.62 ± 0.06 | 250 min. |
| AWG15 | 1.45 ± 0.10 | 0.62 ± 0.06 | 200 min. |
| AWG14 | 1.65 ± 0.10 | 0.62 ± 0.06 | 200 min. |
| AWG13 | 1.80 ± 0.15 | 0.62 ± 0.06 | 200 min. |
| AWG12 | 2.10 ± 0.15 | 0.62 ± 0.06 | 400 min. |
| AWG11 | 2.30 ± 0.15 | 0.62 ± 0.06 | 400 min. |
| AWG10 | 2.60 ± 0.15 | 0.62 ± 0.06 | 400 min. |
| AWG 9 | 2.90 ± 0.15 | 0.62 ± 0.06 | 400 min. |
| AWG 8 | 3.30 ± 0.15 | 0.62 ± 0.06 | 400 min. |
| AWG 7 | 3.70 ± 0.15 | 0.62 ± 0.06 | 400 min. |
| AWG 6 | 4.10 ± 0.20 | 0.62 ± 0.06 | 200 min. |
| AWG 5 | 4.60 ± 0.20 | 0.62 ± 0.06 | 200 min. |
| AWG 4 | 5.20 ± 0.20 | 0.62 ± 0.06 | 200 min. |
| AWG 3 | 5.80 ± 0.20 | 0.62 ± 0.06 | 100 min. |
| AWG 2 | 6.5 ± 0.2 | 0.62 ± 0.06 | 100 min. |
| AWG 1 | 7.3 ± 0.3 | 0.62 ± 0.06 | 100 min. |
| AWG 0 | 8.3 ± 0.3 | 0.62 ± 0.06 | 100 min. |

| Catalog No. 897 | | | |
|-----------------|----------------------|---------------------|-----------------|
| Trade size | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
| 1 × 0.4 | 1.00 ± 0.10 | 0.38 min. | 500 min. |
| 1.5 × 0.4 | 1.50 ± 0.10 | 0.38 min. | 300 min. |
| 2 × 0.4 | 2.00 ± 0.20 | 0.38 min. | 200 min. |
| 3 × 0.4 | 3.00 ± 0.20 | 0.38 min. | 400 min. |
| 4 × 0.4 | 4.00 ± 0.30 | 0.38 min. | 400 min. |
| 5 × 0.4 | 5.00 ± 0.30 | 0.38 min. | 200 min. |
| 6 × 0.4 | 6.0 ± 0.5 | 0.38 min. | 200 min. |
| 7 × 0.4 | 7.0 ± 0.5 | 0.38 min. | 100 min. |
| 8 × 0.4 | 8.0 ± 0.5 | 0.38 min. | 100 min. |
| 9 × 0.4 | 9.0 ± 0.5 | 0.38 min. | 100 min. |
| 10 × 0.4 | 10.0 ± 0.5 | 0.38 min. | 100 min. |

Longitudinal change: min. -10% (200°C x 5 minutes)

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| |
|--------------------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| IRRAX™ TUBE RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAX™ TAPE VZL |

IRRAX™ SLEEVE

| |
|---|
| SCM2 |
| IRRAX™ SLEEVE SBI 300/350 SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™

A
C
A4
LA
C (UL)
D
A2

IRRAX™ TUBE ER2

[150°C heat-resistant flame-retarded tubing]

✓ RoHS directive 10 substances

Waterproofing

Flame-retarded

UL recognized

CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Continuous operating temperature: -55 to 150°C

Features

- Highly heat resistant
- Flame-retarded (PBDE/PBB-free)
- Excellent abrasion resistance

Specifications/Approvals

SFP standard (RE1-2998)

Marking on Surface

◆ SUMITOMO IRRAX™ TUBE ER2

Applications

- Insulation and heat protection of wire harnesses and parts for automobiles
- Protection of wiring where flame retardance is required
- Protection of lead wires and parts which are subject to high temperature

Colors

- Black

Properties

| Properties | Items | Requirements | Typical values* |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 15.7MPa | 23.4MPa |
| | Tensile strength (after aging) | 180°C x 200 hours, min. 9.8MPa | 22.2MPa |
| | Elongation (before aging) | min. 150% | 430% |
| | Elongation (after aging) | 180°C x 200 hours, min. 50% | 420% |
| | Heat shock | 250°C x 4 hours, no crack | Pass |
| | Cold bend | -55°C x 4 hours, no crack | Pass |
| | Secant modulus | 107.9±19.6MPa | 106.4MPa |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Dielectric withstand (after aging) | 180°C x 200 hours, AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹⁰ Ω·cm | 1.8 x 10 ¹⁵ Ω·cm |
| Chemical | Flammability | Flame-retarded (UL224 All Tubing Flame Test) | Pass |

*: For reference use only

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|-----------------|----------------------|---------------------|-----------------|
| 6 × 0.45 | 6.0 ± 0.5 | 0.45 ± 0.05 | 200 min. |
| 8 × 0.45 | 8.0 ± 0.5 | 0.45 ± 0.05 | 100 min. |
| 10 × 0.45 | 10.0 ± 0.5 | 0.45 ± 0.05 | 100 min. |
| 12 × 0.45 | 12.0 ± 0.5 | 0.45 ± 0.05 | 100 min. |

Longitudinal change: min. -10% (125°C x 5 minutes)

IRRAX™ TUBE
IRRAX™ TAPEA
B
F2
F2 (UL)
V2
RP3
B8
ER2
NHR
FE2
VZL

IRRAX™ SLEEVE

SCM2
SBI
300/350
SNHMComposite
articlesSUMISEAL
SUMITUBE SA3 CAPProcessing
equipment

SUMISHRINKER / HEATING GUN

IRRAX™ TUBE NHR

[Halogen-free flame-retarded heat-resistant tubing]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Continuous operating temperature: -40 to 105°C

Features

- Free of halogens
- Highly flame-retarded (compliant with the Combustion Standards for Railway Vehicle Materials by Japan Railway Rolling Stock & Machinery Association)
- Reduced amounts of smoke and harmful gasses when burned

Specifications/Approvals

SFP standard (RE1-3699)

Applications

- Protection and insulation of cables for subway and railway vehicles
- Protection of wiring of equipment in buildings, marine vessels, tunnels, and mass transit vehicles

Colors

- Black

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|---|
| Mechanical | Tensile strength (before aging) | min. 5.9MPa | 8.4MPa |
| | Tensile strength (after aging) | 136°C x 7 days, min. 4.0MPa | 7.4MPa |
| | Elongation (before aging) | min. 200% | 380% |
| | Elongation (after aging) | 136°C x 7 days, min. 100% | 340% |
| | Heat resistivity | 105°C x 1 hour, min. 50% | 8% |
| | Cold bend | -40°C x 1 hour, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. $1.0 \times 10^{10} \Omega \cdot \text{cm}$ | $2.7 \times 10^{14} \Omega \cdot \text{cm}$ |
| Chemical | Flammability | Flame-retarded*2 | Pass |

*1: For reference use only *2: Combustion Standards for Railway Vehicle Materials by Japan Railway Rolling Stock & Machinery Association (18-1011K)

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) | Unit length (m) |
|-----------------|----------------------|---------------------|-----------------|
| 5×0.7 | 5.00±0.50 | 0.70±0.10 | 100 min. |
| 6×0.7 | 6.0 ±0.5 | 0.70±0.10 | 100 min. |
| 8×0.7 | 8.0 ±0.5 | 0.70±0.10 | 100 min. |
| 10×0.7 | 10.0 ±0.5 | 0.70±0.10 | 100 min. |
| 12×0.7 | 12.0 ±0.5 | 0.70±0.10 | 100 min. |
| 14×0.7 | 14.0 ±0.7 | 0.70±0.10 | 100 min. |
| 16×0.7 | 16.0 ±0.7 | 0.70±0.10 | 100 min. |
| 20×0.7 | 20.0 ±0.7 | 0.70±0.10 | 100 min. |
| 24×1 | 24.0 ±1.0 | 1.00±0.15 | 2 min. |
| 28×1 | 28.0 ±1.0 | 1.00±0.15 | 2 min. |
| 30×1 | 30.0 ±1.0 | 1.00±0.15 | 2 min. |
| 35×1 | 35.0 ±1.0 | 1.00±0.15 | 2 min. |
| 42×1 | 42.0 ±1.0 | 1.00±0.15 | 2 min. |
| 50×1.2 | 50.0 ±1.5 | 1.20±0.20 | 2 min. |

Longitudinal change: min. -20% (150°C x 3 minutes)

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™ SLEEVE

| |
|---------|
| SCM2 |
| SBI |
| 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

SUMITUBE™

IRRAX™ TUBE FE2

[Fluoroelastomer heat-resistant tubing]

✓ RoHS directive 10 substances

Waterproofing

Flame-retarded

UL recognized

CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded fluoroelastomer
- Continuous operating temperature: -40 to 200°C

Features

- Excellent oil, high heat, and chemical resistance
- Flexible
- Flame-retarded

Specifications/Approvals

SFP standard (RE1-8792)

Applications

- Protection of wires where heat and oil resistance is required
- Protection of wiring where flexibility is required

Colors

- Black

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|---|-----------------------------|
| Mechanical | Tensile strength (before aging) | min. 8.2MPa | 23.2MPa |
| | Tensile strength (after aging) | 250°C x 7 days, min. 8.2MPa | 10.7MPa |
| | Elongation (before aging) | min. 200% | 220% |
| | Elongation (after aging) | 250°C x 7 days, min. 150% | 180% |
| | Secant modulus | — | 120MPa |
| | Heat shock | 300°C x 4 hours, no crack | Pass |
| Electrical | Dielectric withstand (before aging) | AC2.5kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹² Ω·cm | 1.5 x 10 ¹⁴ Ω·cm |
| Chemical | Oil resistance | Automatic transmission oil 150°C x 1,000 hours | |
| | Tensile strength | min. 8.2MPa | 23.6MPa |
| | Elongation | min. 100% | 233% |
| | Flammability | Flame-retarded | |

*1: For reference use only

Sizes

| Trade size (mm) | Inside diameter (mm) | Wall thickness (mm) (nom.) | Outside diameter (mm) | Unit length (m) |
|-----------------|--|----------------------------|--|-----------------|
| 2.4 × 3.2 | 2.40 ± 0.20 | 0.40 | 3.20 ± 0.30 | 100 min. |
| 4.5 × 5.5 | 4.50 ^{+0.30} / _{+0.50} | 0.50 | 5.50 ^{+0.30} / _{+0.50} | 100 min. |
| 6 × 7 | 6.0 ^{+0.4} / _{+0.6} | 0.50 | 7.0 ^{+0.4} / _{+0.6} | 100 min. |
| 7 × 8 | 7.0 ^{+0.4} / _{+0.6} | 0.50 | 8.0 ^{+0.4} / _{+0.6} | 100 min. |

Longitudinal change: min. -10% (200°C x 10 minutes)

| |
|------------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |
| K |
| K2 |
| KH200 (TW) |
| KH230 (TW) |
| B6 |
| R |
| AN25 |
| W |
| O2C |
| W3C |
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE
IRRAX™ TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™ SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

IRRAX™ TAPE VZL

[Heat-resistant tape]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyvinyl chloride resin (with pressure sensitive adhesive backing)
- Continuous operating temperature: -30 to 105°C

Features

- Thinwall
- Flame-retarded

Specifications/Approvals

SFP standard (RE2-1304)

Applications

- Insulation, bundling, and protection of wire harnesses and parts for automobiles
- Protection and bundling of lead wires and parts which are subject to high temperature
- Protection of wiring where flame retardance is required

Colors

- Gray, Black

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|-------------------------------------|--|-----------------------------|
| Mechanical | Tensile strength (before aging) | 29.4N/19mm in width min. | 33.2N/19mm in width |
| | Tensile strength (after aging) | 120°C x 7 days, 29.4N/19mm in width min. | 33.6N/19mm in width |
| | Elongation (before aging) | min. 125% | 172% |
| | Elongation (after aging) | 120°C x 7 days, min. 100% | 143% |
| | Heat shock | 200°C x 0.5 hours, no melting | Pass |
| | Low temperature resistance | -45°C x 1 hour, no crack | Pass |
| | Peeling | No adhesive sticking to the back surface of the next layer | Pass |
| Electrical | Lap joint adhesion (before aging) | 29.4N/19mm in width min. | 35.0N/19mm in width |
| | Adhesion strength (before aging) | 1.96N/19mm in width min. | 3.3N/19mm in width |
| | Adhesion strength (after aging) | *2 85% of original | 105% |
| Electrical | Dielectric withstand (before aging) | AC1.0kV x 60 sec., no breakdown | Pass |
| | Volume resistivity | min. 1.0 x 10 ¹² Ω·cm | 1.3 x 10 ¹⁵ Ω·cm |
| Chemical | Flammability | Flame-retarded (Oxygen index ≥23.5) | 25.0 |

*1: For reference use only *2: 70°C x 4 hours, immersion in water x 0.5 hours, 70°C x 5 hours

Sizes

| Trade size (mm) | Wall thickness (mm) | Width (mm) | Unit length (m) |
|-----------------|---------------------|------------|-----------------|
| 0.09 x 19 | 0.09 ± 0.02 | 19.0 ± 1.0 | 30 min. |
| 0.09 x 25 | 0.09 ± 0.02 | 25.0 ± 1.0 | 30 min. |

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|------|
| B6 |
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™ SLEEVE

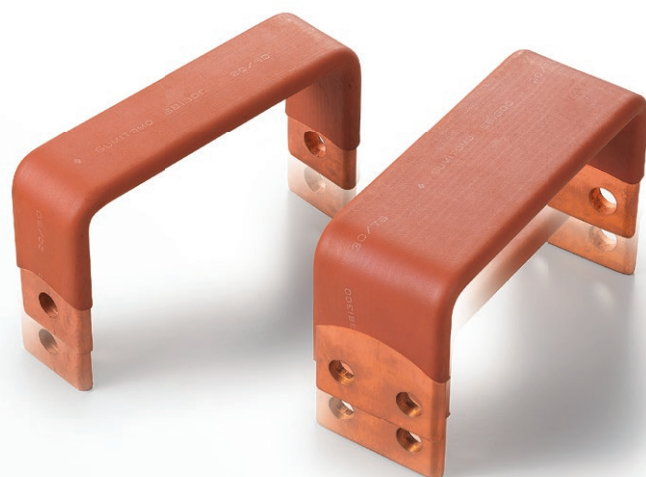
| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN



IRRAX™ SLEEVE

IRRAXSLEEVE is a cross-linked, plastic heat-shrinkable tube with a comparatively large inside diameter, and is mainly used for pipes and cables in infrastructure applications. A heat-shrinkable tube with a hot-melt adhesive inner liner, it exhibits a waterproof performance immediately after shrinking.

IRRAX™ SLEEVE

| | |
|-------------|----------------|
| IRRAXSLEEVE | SCM2 |
| | SBI 300/350 |
| | SNHM |

IRRAX™ SLEEVE SCM2

[Medium wall heat-shrinkable tubing with meltable adhesive]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: min. 60%
: Longitudinal change: min. -10%
- Continuous operating temperature: -55 to 120°C

Features

- Very flexible
- Dual wall, hot-melt adhesive inner liner
- High shrink ratio, 3:1
- Quick shrink
- Excellent adhesion to metal, polyethylene and polyvinyl chloride

Marking on Surface

IRRAXSLEEVE SCM2 XX (XX indicates nominal size)

Applications

- Waterproof sealing and insulation for joints of communications equipment and low voltage cable terminals
- Waterproof sealing and insulation for joints of connectors and cables
- Corrosion protection for metal pipe joints
- Replacement for taping and molding process

Colors

- Black

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|--------------------------------------|--|---|
| Mechanical | Tensile strength (before aging)*2 | min. 10.0MPa | 21.7MPa |
| | Tensile strength (after aging)*2 | 150°C x 168 hours, min. 8.0MPa | 23.5MPa |
| | Elongation (before aging) | min. 350% | 568% |
| | Elongation (after aging) | 150°C x 168 hours, min. 300% | 532% |
| | Low temperature flexibility | -55°C x 1 hour, no crack | Pass |
| Electrical | Hardness (Shore D) | — | 41 |
| | Volume resistivity | min. $1.0 \times 10^{13} \Omega \cdot \text{cm}$ | $2.0 \times 10^{14} \Omega \cdot \text{cm}$ |
| | Tracking resistance | — | 2.75kV x 1 hour |
| | Dielectric constant | — | 4.1 |
| Chemical | Weather resistance | — | — |
| | Weatherometer exposure test | — | — |
| | Tensile strength | — | 94% of original value after 4,000 hours |
| | Elongation | — | 91% of original value after 4,000 hours |
| | Shrinking temperature (start/finish) | — | 70°C / 90°C |

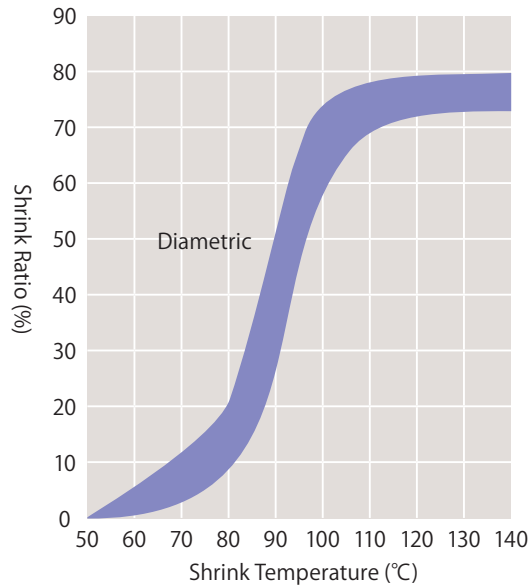
*1: For reference use only *2: Calculated by using outer cross section

Sizes

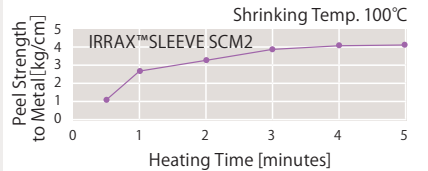
| Trade size*3 | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) |
|--------------|------------------------|--------------------------|--------------------------|-------------------------|------------------------|
| | Inside diameter (min.) | Inside diameter (max.)*4 | Inside diameter (max.)*4 | Wall thickness (nom.)*4 | |
| 04—1220 | 10.2 | 3.80 | 3.80 | 1.50 | 1220 |
| 07—1220 | 19.0 | 5.60 | 5.60 | 2.00 | 1220 |
| 11—1220 | 28.0 | 9.5 | 9.5 | 2.00 | 1220 |
| 13—1220 | 33.0 | 10.2 | 10.2 | 2.00 | 1220 |
| 15—1220 | 38.1 | 12.7 | 12.7 | 2.30 | 1220 |
| 17—1220 | 44.0 | 14.0 | 14.0 | 2.30 | 1220 |
| 20—1220 | 52.0 | 18.2 | 18.2 | 2.30 | 1220 |
| 27—1220 | 70.0 | 25.5 | 25.5 | 2.30 | 1220 |
| 35—1220 | 90.0 | 30.0 | 30.0 | 2.50 | 1220 |
| 50—1220 | 125.0 | 40.0 | 40.0 | 2.50 | 1220 |

Longitudinal change: min. -10% *3: Nominal size shows 10 times value of supplied ID in inches (i.e. 04 is 0.4 inches) *4: Size of outer jacket

Shrink Properties



Adhesion Properties



SUMITUBE™

| |
|-------------|
| A |
| C |
| A4 |
| SUMITUBE LA |
| C (UL) |
| D |
| A2 |

| |
|------------|
| SUMITUBE B |
| LB |

| |
|---------------|
| F (Z) |
| F3 (Z) |
| SUMITUBE NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|-------------|
| F2 (Z) |
| F4 (Z) |
| SUMITUBE B2 |
| B2 (3X) |
| B8 |

| |
|------------|
| SUMITUBE K |
| K2 |

| |
|---------------------|
| SUMITUBE KH200 (TW) |
| SUMITUBE KH230 (TW) |

| |
|------------|
| B6 |
| SUMITUBE R |
| AN25 |

| |
|------------|
| SUMITUBE W |
|------------|

| |
|--------------|
| SUMITUBE O2C |
| W3C |

| |
|---------------|
| O2B2 |
| W3F2 |
| SUMITUBE W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™ TUBE IRRAX™ TAPE

| |
|---------------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| IRRAXTUBE RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| IRRAXTAPE VZL |

IRRAX™ SLEEVE

| |
|-------------------------|
| SCM2 |
| IRRAXSLEEVE SBI 300/350 |
| SNHM |

Composite articles

| |
|------------------|
| SUMISEAL |
| SUMITUBE SA3 CAP |

Processing equipment

SUMISHRINKER / HEATING GUN

IRRAX™ SLEEVE SBI300 / SBI350

[Halogen-free, insulation for busbars in switchgear, heat-shrinkable tubing]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 115°C
- Shrink ratio : Radial change: min. 50%
: Longitudinal change: min. -15%
- Continuous operating temperature: -40 to 120°C

Features

- Excellent electrical performance
- Protection against flashover
- Stable performance for continuous use in switchgear
- Flexible enough to heat-shrink on bent (90°) busbars
- Flame retardancy (self-extinguishing)

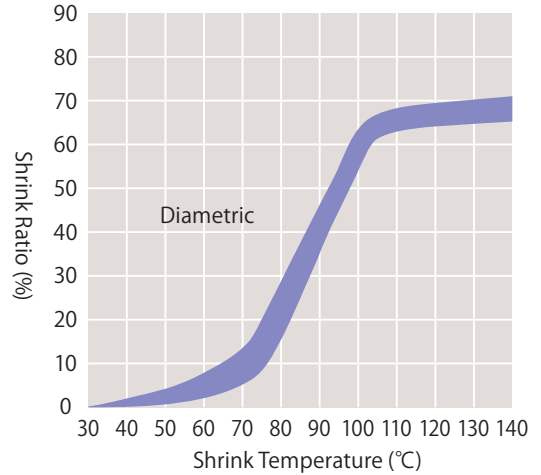
Marking on Surface

- SB1300 :
◆SUMITOMO IRRAX SLEEVE SBI300 XX/YY HF(XX/YY : SIZE)
- SB1350 :
◆SUMITOMO IRRAX SLEEVE SBI350 XX/YY HF(XX/YY : SIZE)

Applications

- Insulation for busbars in switchgear up to 36kV

Shrink Properties



Colors

- Red

Properties

| Properties | Items | Requirements | Typical values*1 |
|------------|--------------------------------------|---------------------------------|-----------------------------------|
| Mechanical | Tensile strength (before aging) | min. 5.0MPa | 7.6MPa |
| | Tensile strength (after aging) | 160°C x 168 hours, min. 5.0 MPa | 9.6MPa |
| | Elongation (before aging) | min. 300% | 525% |
| | Elongation (after aging) | 160°C x 168 hours, min. 200% | 490% |
| | Specific gravity | — | 1.31 |
| | Low temperature flexibility | -40°C x 4 hours, no crack | Pass |
| Electrical | Dielectric strength | min. 10.0kV/mm | 39.5kV/mm (wall thickness 0.94mm) |
| | Volume resistivity | — | 7.8 x 10 ¹⁶ Ω·cm |
| | Dielectric constant | — | 2.7 |
| Chemical | Water absorption | 23°C x 24 hours | 0.45 |
| | Flammability (UL224) | Pass (All tubing flame Test) | Pass |
| | Shrinking temperature (start/finish) | — | 70°C / 100°C |

*1: For reference use only

Sizes

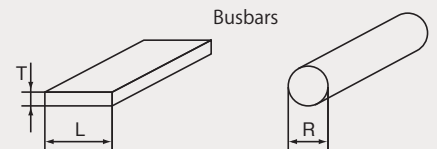
| IRRAX™ SLEEVE SBI300 | | | | | | | | |
|----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|-------------------------------|-----------------------|--|
| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | Suitable busbar size (mm) | | |
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (nom.) | | Rectangular L+T (min.) (max.) | Round R (min.) (max.) | |
| 6/15 | 15.0 | 1.10 | 6.00 | 2.00 | 25 | 12 — 18 | 6.5 — 12.0 | |
| 12/30 | 30.0 | 1.10 | 12.0 | 2.30 | 25 | 22 — 38 | 13.5 — 25.0 | |
| 20/50 | 50.0 | 1.10 | 20.0 | 2.50 | 25 | 36 — 65 | 22.0 — 43.0 | |
| 30/75 | 75.0 | 1.10 | 30.0 | 2.50 | 25 | 55 — 95 | 33.0 — 63.0 | |
| 40/100 | 100.0 | 1.10 | 40.0 | 2.50 | 25 | 70 — 130 | 44.0 — 86.0 | |
| 50/120 | 120.0 | 1.30 | 50.0 | 3.00 | 25 | 90 — 165 | 55.0 — 105.0 | |

| IRRAX™ SLEEVE SBI350 | | | | | | | | |
|----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|-------------------------------|-----------------------|--|
| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | Unit length (min.) (m) | Suitable busbar size (mm) | | |
| | Inside diameter (min.) | Wall thickness (nom.) | Inside diameter (max.) | Wall thickness (nom.) | | Rectangular L+T (min.) (max.) | Round R (min.) (max.) | |
| 10/25 | 25.0 | 1.60 | 10.0 | 4.00 | 25 | 17 — 28 | 11.0 — 20.0 | |
| 16/40 | 40.0 | 1.60 | 16.0 | 4.00 | 25 | 28 — 45 | 18.0 — 32.0 | |
| 25/65 | 65.0 | 1.60 | 25.0 | 4.00 | 25 | 45 — 67 | 28.0 — 47.0 | |
| 40/100 | 100.0 | 1.60 | 40.0 | 4.00 | 25 | 67 — 102 | 44.0 — 72.0 | |

Longitudinal change: min. -15%

Minimum Clearances (Typical Values)

| | Commercial voltage | Impulse voltage | Phase to phase clearances for rectangular busbars |
|----------------------|--------------------|-----------------|---|
| IRRAX™ SLEEVE SBI300 | 12kV | 75kV | 20mm |
| | 24kV | 125kV | 70mm |
| IRRAX™ SLEEVE SBI350 | 36kV | 170kV | 120mm |



- SUMITUBE™
 - A
 - C
 - A4
 - LA
 - C (UL)
 - D
 - A2
- SUMITUBE
 - B
 - LB
- SUMITUBE
 - F (Z)
 - F3 (Z)
 - NHR2
 - NHR4
 - V (300V)
 - V (600V)
- SUMITUBE
 - F2 (Z)
 - F4 (Z)
 - B2
 - B2 (3X)
 - B8
- SUMITUBE
 - K
 - K2
- SUMITUBE
 - KH200 (TW)
 - KH230 (TW)
- SUMITUBE
 - B6
 - R
 - AN25
- SUMITUBE
 - W
- SUMITUBE
 - O2C
 - W3C
- SUMITUBE
 - O2B2
 - W3F2
 - W3B2
 - W3B2 (4X)
 - SA2
 - SA3
- IRRAX™ TUBE
- IRRAX™ TAPE
 - A
 - B
 - F2
 - F2 (UL)
 - V2
 - RP3
 - B8
 - ER2
 - NHR
 - FE2
- IRRAX TAPE
 - VZL
- IRRAX™ SLEEVE
 - SCM2
 - SBI 300/350
 - SNHM
- Composite articles
- SUMISEAL
- SUMITUBE SA3 CAP
- Processing equipment
- SUMISHRINKER / HEATING GUN

IRRAX™ SLEEVE SNHM

[Halogen-free flame-retarded medium wall tubing]

✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Cross-linked flexible flame-retarded polyolefin
- Shrink temperature : min. 110°C
- Shrink ratio : Radial change: min. 50%
: Longitudinal change: min. -15%
- Continuous operating temperature: -30 to 105°C

Features

- Halogen-free
- Reduced acidic gas emission and smoke generation in case of fire
- Flame-retarded
- High shrink ratio, 3:1
- Excellent encapsulation
- EN45545-2

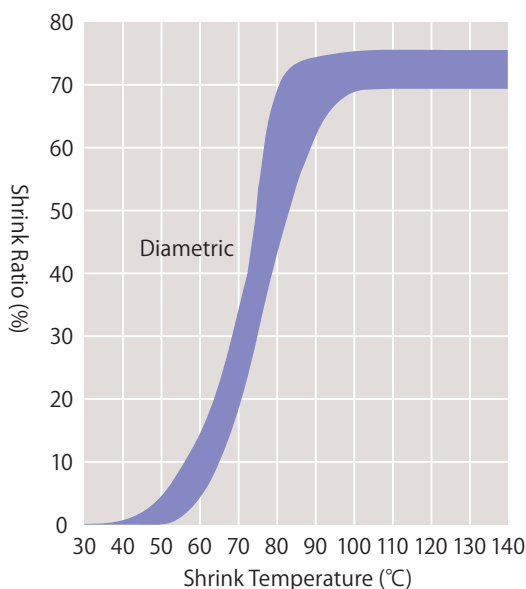
Applications

- Protection of cables and pipes for mass transit vehicles and ships or in tunnels and buildings
- Encapsulation of connectors and cables

Colors

- Black

Shrink Properties



Properties

| Properties | Items | Requirement | Typical values*1 |
|---------------------|---|----------------------------------|-----------------------------|
| Mechanical | Tensile strength*3 (before aging) | min. 7.8MPa | 11.3MPa |
| | Tensile strength*3 (after aging) | 140°C x 168 hours, min. 5.4MPa | 96% |
| | Elongation (before aging) | min. 200% | 530% |
| | Elongation (after aging) | 140°C x 168 hours, min. 100% | 320% |
| | Low temperature flexibility | -30°C x 1 hour, no crack | Pass |
| Electrical | Volume resistivity | min. 1.0 x 10 ¹² Ω·cm | 8.0 x 10 ¹⁴ Ω·cm |
| | Hardness | | 42 |
| Chemical | Weather resistance for 4,000 hours | | |
| | Tensile strength | | 98% |
| | Elongation | | 72% |
| | Flammability*2 | Flame-retarded | Flame-retarded |
| | Oxygen index | — | 26 |
| | Copper mirror corrosion: 175°C x 16 hours | No corrosion | Pass |
| | EN45545-2 (R22,HL3) | | |
| Oxygen index | min. 32% | 37.4% | |
| Smoke density | max. 150 | 51.16 | |
| Toxic fume emission | max. 0.75 | 0.05 | |

*1: For reference use only *2: Combustion Standards for Railway Vehicle Materials by Japan Railway Rolling Stock & Machinery Association
*3: Calculated by using outer cross section

Sizes

| Trade size | As supplied (mm) | | After recovered | | Unit length (min.) (mm) |
|-------------|------------------------|--------------------------|-------------------------|--|-------------------------|
| | Inside diameter (min.) | Inside diameter*4 (max.) | Wall thickness*4 (nom.) | | |
| 7/ 25— 900 | 23.0 | 7.0 | 1.50 | | 900 |
| 11/ 25— 900 | 25.0 | 11.0 | 1.70 | | 900 |
| 16/ 40— 900 | 40.0 | 16.0 | 1.70 | | 900 |
| 20/ 50— 900 | 50.0 | 20.0 | 1.70 | | 900 |
| 24/ 65— 900 | 65.0 | 24.0 | 2.30 | | 900 |
| 28/ 75— 900 | 75.0 | 28.0 | 2.30 | | 900 |
| 32/ 85— 900 | 85.0 | 32.0 | 2.30 | | 900 |
| 33/110— 900 | 110.0 | 33.0 | 2.30 | | 900 |
| 55/150— 900 | 150.0 | 55.0 | 3.00 | | 900 |

Longitudinal change: min. -10% *4: Outer layer only

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

SUMITUBE

| |
|----------|
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

SUMITUBE

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

SUMITUBE

| |
|----|
| K |
| K2 |

SUMITUBE

| |
|------------|
| KH200 (TW) |
| KH230 (TW) |

SUMITUBE

| |
|------|
| B6 |
| R |
| AN25 |

SUMITUBE

| |
|-----|
| W |
| O2C |
| W3C |

SUMITUBE

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE

IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |

IRRAX™SLEEVE

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

SUMISEAL

SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN



Composite articles and processing equipment

Composite articles

SUMISEAL
SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

SUMISEAL

[Watertight crimp connector tube]

Catalog No. 987 ✓ RoHS directive 10 substances

Waterproofing Flame-retarded UL recognized CSA recognized



Basic Properties

- Material: Electron beam cross-linked semi-rigid polyolefin, hot-melt adhesive, and copper crimp barrel
- Shrink temperature : min. 120°C
- Continuous operating temperature : -40 to 105°C

Advantages

- Sumiseal comprises a copper crimp barrel and heat-shrinkable semi-rigid two-layer polyolefin tube. The crimp barrel connects electrical wires when crimped, while the tube insulates the wires. Hot-melt adhesive is coated over the inner wall of the two-layer tube so that the adhesive melts and fills the gap between the crimped barrel and wire when the tube is shrunk. Because of the above feature, Sumiseal can be used to connect electrical wires, and at the same time, protect the wire joint from water, dust, and other undesirable external influences. Moreover, connecting wires using this product makes the wire joint smoother, more compact, and more reliable than conventional tape-based waterproofing processes.

Specifications/Approvals

- SFP standard (RE4-0200)

Applications

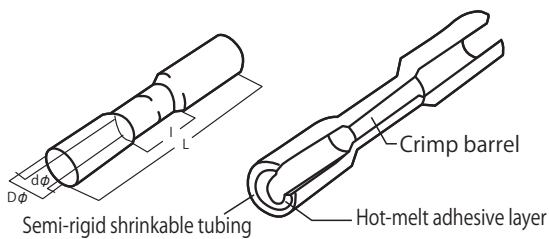
- Protection of wire harnesses in automobiles and wire joints in household electrical appliances, ships, machine tools, and other equipment from water, oil, vibration, and dust

Colors

- Transparent Yellow, Transparent Red, Transparent Blue

Specifications

| Product serial number | Performance | | | |
|-----------------------|------------------------------|---------------|---------------|-------------------|
| | Material | Rated voltage | Rated current | Rated temperature |
| SS-2220 | Copper sleeve | 600V | 19A | 105°C |
| SS-1816 | Copper | 600V | 19A | 105°C |
| SS-1414 | Semi-rigid shrinkable tubing | 600V | 27A | 105°C |
| SS-1010 | Two-layer shrinkable tubing | 600V | 49A | 105°C |

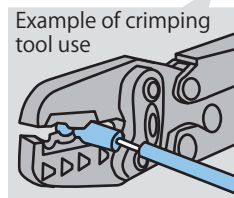
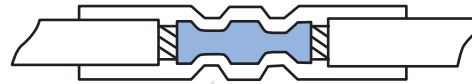


Crimping Process

① Insert electrical wires into sleeve



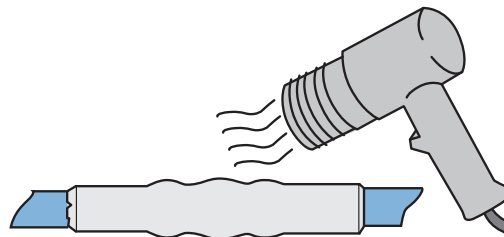
② Crimp



Example of crimping tool use

To ensure that SUMISEAL achieves its full performance, always use the crimping tool specified by Sumitomo Electric.

③ Heat shrink



Heat the outer sleeve with a heat gun or other suitable heater. The adhesive inside the tubing will melt and bind the wires and outer insulation closely together, optimizing the sealing of the finished splice.

Shrinkage temperature: 120°C

Properties

| Items | Test method and judgment criteria |
|-----------------------------------|--|
| Withstand voltage | Apply AC3,400V (60 Hz) between the outer surface of the test specimen (seal) and the electrical wire inside the specimen. The specimen must withstand the test voltage for 1 minute. |
| Sealing performance | After immersing in water for 1 month at a depth of 1m, the test specimen must pass the withstand voltage test. |
| Thermal cycle | After 5 thermal cycles (1 cycle = -25°C x 30 min → 20°C x 10 min → 75°C x 30 min → 20°C x 10 min), the test specimen must pass the withstand voltage test. |
| Low-temperature performance | Crimp the test specimen at -20°C, leave it for 1 hour at -55°C, then allow it to return to room temperature. The test specimen must pass the withstand voltage test. |
| Low-vibration fatigue performance | After subjecting to vibration for 8 hours at an acceleration of 7G, the test specimen must pass the withstand voltage test. |

Size

| Product serial number | Dimensions (mm) | | | | Applicable wire size | | Specialized crimping tool | Standard colors |
|-----------------------|-----------------|-----|----|------|----------------------|-------|---------------------------|--------------------|
| | dφ | Dφ | L | l | mm ² | AWG | | |
| SS-2220 | 1.4 | 3.8 | 25 | 11.5 | 0.3 - 0.5 | 22-20 | NH-82 | Transparent Yellow |
| SS-1816 | 1.7 | 4.2 | 37 | 15.0 | 0.75 - 1.25 | 18-16 | NH-82 | Transparent Red |
| SS-1414 | 2.3 | 4.9 | 37 | 15.0 | 2.0 | 14 | NH-82 | Transparent Blue |
| SS-1010 | 3.4 | 6.4 | 42 | 15.0 | 5.5 | 10 | NH-82 | Transparent Yellow |

SUMITUBE™

| |
|--------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |

| |
|----|
| B |
| LB |

| |
|----------|
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |

| |
|---------|
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |

| |
|----|
| K |
| K2 |

| |
|------------|
| KH200 (TW) |
|------------|

| |
|------------|
| KH230 (TW) |
|------------|

| |
|----|
| B6 |
|----|

| |
|------|
| R |
| AN25 |

| |
|---|
| W |
|---|

| |
|-----|
| O2C |
| W3C |

| |
|-----------|
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

SUMISEAL

SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

SA3 CAP

[Sealing caps for automobiles, flame-retarded heat-shrinkable tubing with meltable adhesive]

✓ RoHS directive 10 substances

Waterproofing

Flame-retarded

UL recognized

CSA recognized



Basic Properties

- Material: Outer: Irradiated cross-linked semi-rigid flame-retarded polyolefin
Inner : Meltable adhesive
- Shrink temperature: min. 135°C
- Shrink ratio: Radial change: min. 75%
- Continuous operating temperature: -40 to 105°C

Features

- High shrink ratio and effective for waterproofing of multiple harness terminations
- Retains positioning at high temperature
- Flame-retarded outer jacket (PBDE/PBB-free)
- Abrasion resistant

Applications

- Waterproof sealing, insulation and reinforcement for harness joints and splices of motor vehicles/electronic devices

Colors

- Black

| |
|------------|
| A |
| C |
| A4 |
| LA |
| C (UL) |
| D |
| A2 |
| B |
| LB |
| F (Z) |
| F3 (Z) |
| NHR2 |
| NHR4 |
| V (300V) |
| V (600V) |
| F2 (Z) |
| F4 (Z) |
| B2 |
| B2 (3X) |
| B8 |
| K |
| K2 |
| KH200 (TW) |
| KH230 (TW) |
| B6 |
| R |
| AN25 |
| W |
| O2C |
| W3C |
| O2B2 |
| W3F2 |
| W3B2 |
| W3B2 (4X) |
| SA2 |
| SA3 |

IRRAX™TUBE IRRAX™TAPE

| |
|---------|
| A |
| B |
| F2 |
| F2 (UL) |
| V2 |
| RP3 |
| B8 |
| ER2 |
| NHR |
| FE2 |
| VZL |

IRRAX™SLEEVE

| |
|-------------|
| SCM2 |
| SBI 300/350 |
| SNHM |

Composite articles

SUMISEAL

SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

Properties

| Properties | Items | Requirements | Typical values*1 |
|--|---|--|---|
| Mechanical | Tensile strength*2 | min. 10.4MPa | 25.8MPa |
| | Elongation | min. 300% | 550% |
| | Heat shock | 225°C x 4 hours, no crack | Pass |
| | Heat resistance | 130°C x 7 days, no crack | Pass |
| | Secant modulus | min. 150MPa | 463MPa |
| | Dynamic cut-through | min. 134N | 529N |
| Electrical | Dielectric strength | min. 15kV/mm | 20.6kV/mm |
| | Volume resistivity | min. $1.0 \times 10^{12} \Omega \cdot \text{cm}$ | $9.6 \times 10^{15} \Omega \cdot \text{cm}$ |
| Chemical | Flammability | SAE J1128, self-extinguish within 70 sec. | Pass |
| Splice performance (on representative splice configurations) | Testing to SFP internal standard | | |
| | • Heat aging: 125°C x 1008 hours | | Pass |
| | • Heat cycle: 125 cycles, 125°C (30 minutes) to -40°C (30 minutes) | | Pass |
| | • Fluid resistance: 2-hour immersion in: brake fluid, engine coolant, ASTM Reference Oil #3, automatic transmission fluid | | Pass |

*1: For reference use only *2: Calculated by using outer cross section

Sizes

| Trade size (mm) | As supplied (mm) | | After recovered (mm) | | | Unit length (min.) (m) | Marking of Surface |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|---------------------------|------------------------|--------------------|
| | Inside diameter (min.) | Wall thickness*3 (nom.) | Inside diameter (max.) | Wall thickness*3 (min.) | Adhesive thickness (nom.) | | |
| 5.8/1.2 × 50L | 5.80 | 0.45 | 1.26 | 1.20 | 0.56 | 50 ± 3 | SA3-1 |
| 7.5/1.6 × 50L | 7.5 | 0.60 | 1.64 | 1.52 | 0.76 | 50 ± 3 | SA3-2 |
| 10.9/2.4 × 50L | 10.9 | 0.70 | 2.40 | 1.91 | 1.02 | 50 ± 3 | SA3-3 |

*3: Including inner adhesive

SUMISHRINKER (SS001)

[Tube shrinking machine for harness joints]

This machine is used to shrink SUMITUBE heat-shrinkable tubing products over wire splices and harness joints.

Basic Characteristics

- Continuous processing of harness joints on a belt conveyor
- High-reliability waterproofing of joints by proper temperature/speed control
- Fail-proof system that reverses the belt conveyor direction if the heating temperature deviates from a preset range
- Stable temperature control with upper and lower ceramic heaters
- Desktop device with an overall length of 1m

Specifications

| Item | Description |
|------------------------------------|---|
| Power source | Single-phase AC200V, 50/60Hz |
| Power consumption | 2.0kW |
| Heater | Far-infrared ceramic surface heater 200V 1 kW x 2 (upper and lower surfaces) |
| Temperature control | PID control by K-thermocouple on upper heater |
| Heating temperature range | Recommended preset temperature: 550°C |
| Workpiece conveyance method | Conveys workpieces on two belts Distance between belts: 170mm |
| Belt conveyor speed variable range | 0.3 - 3.0m/min |
| Applicable tube size | Inside diameter: max. 20mm |
| Applicable tube length | max. 80mm |
| Weight | 40kg |
| Outside dimensions | 202 (W) x 980 (L) x 670 (H) mm |
| Safety measures | Circuit breaker (turns off power source) |
| | Emergency stop button (stops heaters, belt conveyor, and fan) |
| | Door-open detection switch (stops heaters and belt conveyor) |

Note: Use a power plug that matches the power socket at the SUMISHRINKER installation site.
Please use a transformer according to a voltage.



SUMITUBE™

A
C
A4
LA
C (UL)
D
A2

B
LB

F (Z)
F3 (Z)
NHR2
NHR4
V (300V)
V (600V)

F2 (Z)
F4 (Z)
B2
B2 (3X)
B8

K
K2

KH200 (TW)

KH230 (TW)

B6
R

AN25

W

O2C
W3C

O2B2
W3F2

W3B2
W3B2 (4X)

SA2
SA3

IRRAX™TUBE IRRAX™TAPE

A
B

F2
F2 (UL)

V2

RP3
B8

ER2
NHR

FE2
VZL

IRRAX™SLEEVE

SCM2

SBI
300/350
SNHM

Composite articles

SUMISEAL
SUMITUBE SA3 CAP

Processing equipment

SUMISHRINKER / HEATING GUN

HEATING GUN (FV310 / 883B)

[Industrial heating tool]

Advantages

- An industrial hot-air processor for shrinking, drying, fusing, or bending an object with hot air
- Speeds up the process by heating the object continuously with a powerful heater
- The heater is wound on a glass insulator to provide extended life of the gun
- Plastic body reduces weight

Specifications

| | FV310 | 883B |
|-------------------------------|--------------------------------|-------------------------------|
| Item | Description | Description |
| Power source | AC100V 50/60Hz | |
| Power consumption | 1,000W | |
| Plug shape | Flat plug | |
| Maximum hot-air temperature*1 | 50~530°C (continuous scale) | 500°C |
| Hot-air speed | 600m/min. | 1,250m/min. |
| Hot-air flow rate | 0.15~0.25m ³ /min | 0.2m ³ /min. |
| Outside dimensions | 240(W)x190(H)x70(D) mm | 260 (W) x 190 (H) x 75 (D) mm |
| Weight*2 | 600g | 750g |

*1: Maximum hot-air temperature is an approximate value measured 10mm from nozzle outlet.

*2: Weight does not include weight of cord.

FV310



883B



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