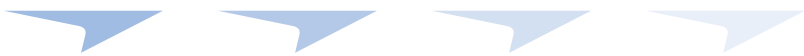




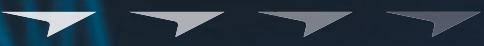
# Electronic Wire & Cable



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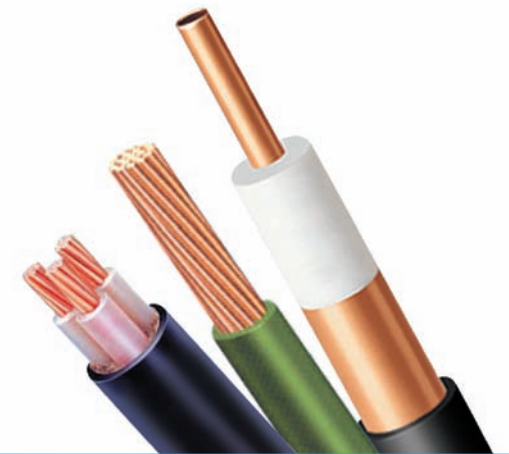
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➤➤➤➤ **Electronic Wire & Cable**

# Electronic Wire & Cable



## New Dream, New Start

To become a leader in the competitive global market, LG has been divided into three groups, electronics and chemicals for LG, energy and distribution for GS, Industrial electric • electronics and material for LS based on their business specialties.

LS, led by John Koo(former CEO of LG Electronics), has 17 companies with LS Cable as our flagship company. LS is the 15th largest conglomerate with \$5.7 billion asset and \$8.7 billion sales in 2004.

LS' main companies, such as LS Cable, LS industrial systems, LS-Nikko copper, Gaon cable, E1 and Kukdong City Gas, are ranked as No.1 in their respective industry. However, LS won't just sit back, satisfied with being the best in Korea. We will pave the way for becoming the world's best in industrial electric • electronics and material industry with the new CI, LS.





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# 1-1 Lead Wire

Lead Free Heat-resistant PVC insulated wire

## UL Style No.1007 CSA Type TR-64

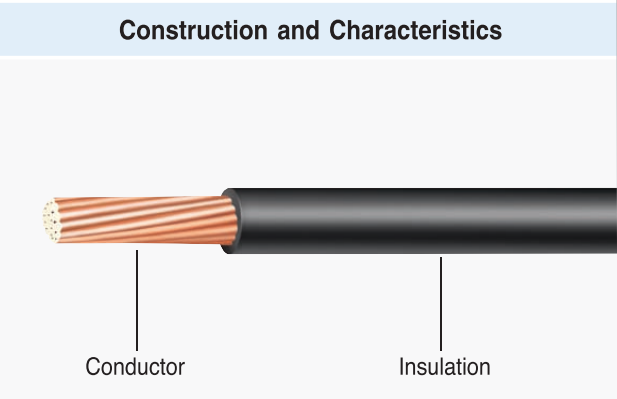
- Rating UL : 300V, 80°C / CSA : 300V (Peak 600V), 90°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

### Application

Internal wiring of electrical and electronic equipments (Secondary circuits lead wire).

### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



### Marking

1007 E52853 VW-1  AWM LL33908 CSA TR-64 90C FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.40                   | 1.11          | 381.00                              | 10                                          | 2,000                             | 2.3                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.40                   | 1.18          | 239.00                              | 10                                          | 2,000                             | 3.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 150.00                              | 10                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.40                   | 1.41          | 94.20                               | 10                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.40                   | 1.56          | 59.40                               | 10                                          | 2,000                             | 7.2                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.40                   | 1.74          | 36.70                               | 10                                          | 2,000                             | 9.4                               | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.40                   | 1.98          | 23.20                               | 10                                          | 2,000                             | 12.5                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.40                   | 2.29          | 14.60                               | 10                                          | 2,000                             | 15.9                              | 305(1,000)           |
| Solid    | 30         | 1/0.254               | 0.26          | 0.40                   | 1.06          | 361.00                              | 10                                          | 2,000                             | 2.3                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.40                   | 1.12          | 227.00                              | 10                                          | 2,000                             | 3.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.40                   | 1.20          | 143.00                              | 10                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.40                   | 1.31          | 89.30                               | 10                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.40                   | 1.44          | 56.40                               | 10                                          | 2,000                             | 7.2                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.40                   | 1.61          | 35.20                               | 10                                          | 2,000                             | 9.4                               | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.40                   | 1.82          | 22.20                               | 10                                          | 2,000                             | 12.5                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.40                   | 2.09          | 14.00                               | 10                                          | 2,000                             | 15.9                              | 305(1,000)           |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 150.00                              | 10                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.40                   | 1.41          | 94.20                               | 10                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.40                   | 1.56          | 59.40                               | 10                                          | 2,000                             | 7.2                               | 610(2,000)           |

- Remarks 1) Size range : UL 32-16AWG, CSA 28-16AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 80°C, single-wire in air



# 1-2 Lead Wire

Lead Free Heat-resistant PVC insulated wire

## UL Style No.1015 CSA Type TEW

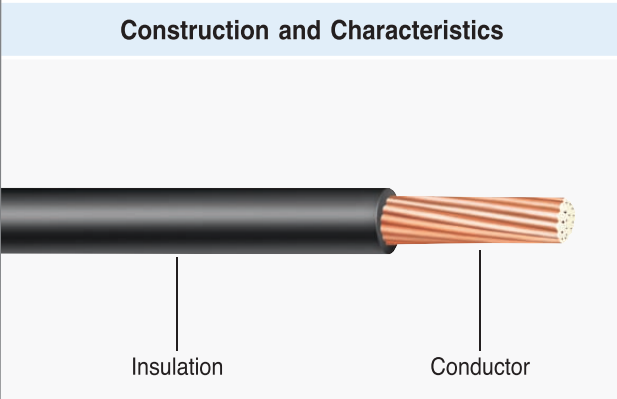
- Rating UL : 600V, 105°C / CSA : 600V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

### Application

Internal wiring of electrical and electronic equipments (Primary circuits lead wire).

### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



### Marking

1015 E52853 VW-1  AWM 105C LL33911 CSA TEW 105C 600V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.79                   | 2.06          | 150.00                              | 15                                          | 2,000                             | 5.8                               | 305(1,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.79                   | 2.19          | 94.20                               | 15                                          | 2,000                             | 7.6                               | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.79                   | 2.34          | 59.40                               | 15                                          | 2,000                             | 10.0                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.79                   | 2.52          | 36.70                               | 15                                          | 2,000                             | 13.1                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.79                   | 2.76          | 23.20                               | 15                                          | 2,000                             | 17.2                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.79                   | 3.08          | 14.60                               | 15                                          | 2,000                             | 22.8                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.79                   | 3.46          | 8.96                                | 15                                          | 2,000                             | 30.4                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.79                   | 3.94          | 5.64                                | 15                                          | 2,000                             | 40.6                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.79                   | 4.58          | 3.55                                | 15                                          | 2,000                             | 55.3                              | 305(1,000)           |
| Solid    | 26         | 1/0.404               | 0.40          | 0.79                   | 1.98          | 143.00                              | 15                                          | 2,000                             | 5.8                               | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.79                   | 2.09          | 89.30                               | 15                                          | 2,000                             | 7.6                               | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.79                   | 2.22          | 56.40                               | 15                                          | 2,000                             | 10.0                              | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.79                   | 2.39          | 35.20                               | 15                                          | 2,000                             | 13.1                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.79                   | 2.60          | 22.20                               | 15                                          | 2,000                             | 17.2                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.79                   | 2.87          | 14.00                               | 15                                          | 2,000                             | 22.8                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.79                   | 3.21          | 8.78                                | 15                                          | 2,000                             | 30.4                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.79                   | 3.63          | 5.53                                | 15                                          | 2,000                             | 40.6                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.79                   | 4.17          | 3.48                                | 15                                          | 2,000                             | 55.3                              | 305(1,000)           |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.79                   | 2.19          | 94.20                               | 15                                          | 2,000                             | 7.6                               | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.79                   | 2.34          | 59.40                               | 15                                          | 2,000                             | 10.0                              | 305(1,000)           |

- Remarks 1) Size range : UL 28-9AWG, CSA 26-4/0AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air  
3) UL1015 covers the construction and characteristics of UL1011 and UL1013, so use of UL1015 is recommended.



### 1-3 Lead Wire

Lead Free Heat-resistant PVC insulated wire

## UL Style No.10272 CSA Type AWM

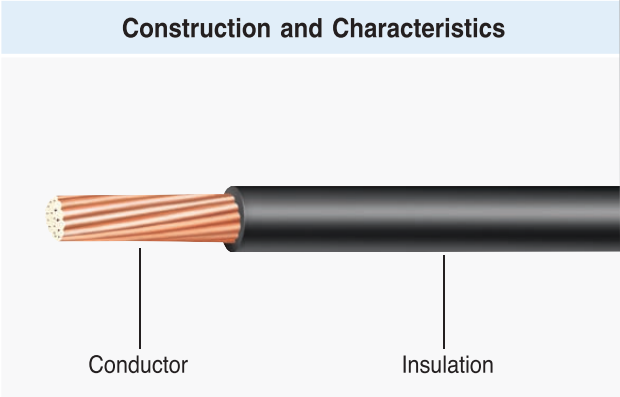
- Rating UL : 150V, 80°C / CSA : 150V, 80°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

### Application

Internal wiring of electrical and electronic equipments.

### Features

1. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



### Marking

10272 E52853 VW-1  AWM I A 80C 150V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.20                   | 0.88          | 150.00                              | 10                                          | 1,500                             | 1,220(4,000)         |
|          | 24         | 11/0.160              | 0.61          | 0.20                   | 1.01          | 94.20                               | 10                                          | 1,500                             | 610(2,000)           |

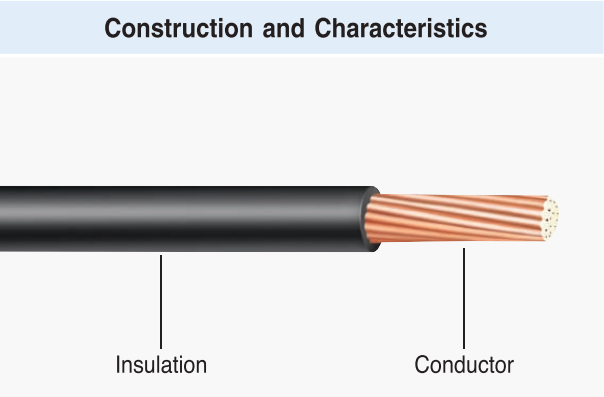
► Remarks 1) Size range : UL 36-20AWG



### 1-4 Lead Wire

Lead Free Heat-resistant PVC insulated wire

## UL Style No.1032 CSA Type TR-32



- Rating UL : 1,000Vac (1,200Vdc), 90°C / CSA : 1,400V (Peak), 90°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

### Application

It is optimum as lead wire of high voltage circuit of TV receivers and other electronic equipments.

### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

### Marking

1032 E52853 VW-1  AWM 90C 1.2KVDC LL33908 CSA TR-32 FT1 90C AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 24         | 11/0.160              | 0.61          | 0.80                   | 2.21          | 94.20                               | 15                                          | 3,000                             | 6.6                               | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.80                   | 2.36          | 59.40                               | 15                                          | 3,000                             | 8.7                               | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.80                   | 2.54          | 36.70                               | 15                                          | 3,000                             | 11.4                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.80                   | 2.78          | 23.20                               | 15                                          | 3,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.80                   | 3.09          | 14.60                               | 15                                          | 3,000                             | 19.9                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.80                   | 3.48          | 8.96                                | 15                                          | 3,000                             | 26.5                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.80                   | 3.96          | 5.64                                | 15                                          | 3,000                             | 35.4                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.80                   | 4.60          | 3.55                                | 15                                          | 3,000                             | 48.2                              | 305(1,000)           |
| Solid    | 24         | 1/0.511               | 0.51          | 0.80                   | 2.11          | 89.30                               | 15                                          | 3,000                             | 6.6                               | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.80                   | 2.24          | 56.40                               | 15                                          | 3,000                             | 8.7                               | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.80                   | 2.41          | 35.20                               | 15                                          | 3,000                             | 11.4                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.80                   | 2.62          | 22.20                               | 15                                          | 3,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.80                   | 2.89          | 14.00                               | 15                                          | 3,000                             | 19.9                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.80                   | 3.23          | 8.78                                | 15                                          | 3,000                             | 26.5                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.80                   | 3.65          | 5.53                                | 15                                          | 3,000                             | 35.4                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.80                   | 4.19          | 3.48                                | 15                                          | 3,000                             | 48.2                              | 305(1,000)           |
| TA-SC    | 22         | 7/0.254               | 0.76          | 0.80                   | 2.36          | 59.40                               | 15                                          | 3,000                             | 8.7                               | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.80                   | 2.56          | 36.70                               | 15                                          | 3,000                             | 11.4                              | 305(1,000)           |

- Remarks 1) Size range : UL 26-10AWG, CSA 24-10AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 90°C, single-wire in air





1-5 Lead Wire  
Lead Free Heat-resistant semi-rigid PVC insulated wire

UL Style No.1061 CSA Type AWM

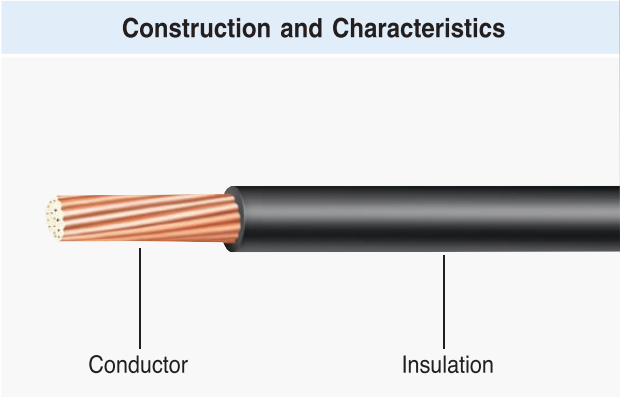
- Rating UL : 300V, 80°C / CSA : 300V, 80°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

Application

1. Internal wiring of electrical and electronic equipments.
2. Wiring of small equipment when space is a problem.

Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Small outer diameter saves space.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

1061 E52853 VW-1 AWM LL57184 CSA AWM I A 80C 300V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.25                   | 0.81          | 381.00                              | 10                                          | 2,000                             | 2.0                               | 1,220(4,000)         |
|          | 28         | 7/0.127               | 0.38          | 0.25                   | 0.88          | 239.00                              | 10                                          | 2,000                             | 2.6                               | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.25                   | 0.98          | 150.00                              | 10                                          | 2,000                             | 3.4                               | 1,220(4,000)         |
|          | 24         | 11/0.160              | 0.61          | 0.25                   | 1.11          | 94.20                               | 10                                          | 2,000                             | 4.6                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.25                   | 1.26          | 59.40                               | 10                                          | 2,000                             | 6.1                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.25                   | 1.44          | 36.70                               | 10                                          | 2,000                             | 8.4                               | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.30                   | 1.78          | 23.20                               | 10                                          | 2,000                             | 11.3                              | 610(2,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.30                   | 2.09          | 14.60                               | 10                                          | 2,000                             | 15.2                              | 305(1,000)           |
| Solid    | 30         | 1/0.254               | 0.26          | 0.25                   | 0.76          | 361.00                              | 10                                          | 2,000                             | 2.0                               | 1,220(4,000)         |
|          | 28         | 1/0.320               | 0.32          | 0.25                   | 0.82          | 227.00                              | 10                                          | 2,000                             | 2.6                               | 1,220(4,000)         |
|          | 26         | 1/0.404               | 0.40          | 0.25                   | 0.90          | 143.00                              | 10                                          | 2,000                             | 3.4                               | 1,220(4,000)         |
|          | 24         | 1/0.511               | 0.51          | 0.25                   | 1.01          | 89.30                               | 10                                          | 2,000                             | 4.6                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.25                   | 1.14          | 56.40                               | 10                                          | 2,000                             | 6.1                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.25                   | 1.31          | 35.20                               | 10                                          | 2,000                             | 8.4                               | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.30                   | 1.62          | 22.20                               | 10                                          | 2,000                             | 11.3                              | 610(2,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.30                   | 1.89          | 14.00                               | 10                                          | 2,000                             | 15.2                              | 305(1,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.25                   | 0.88          | 239.00                              | 10                                          | 2,000                             | 2.6                               | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.25                   | 0.98          | 150.00                              | 10                                          | 2,000                             | 3.4                               | 1,220(4,000)         |
|          | 24         | 7/0.203               | 0.61          | 0.25                   | 1.11          | 94.20                               | 10                                          | 2,000                             | 5.6                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.25                   | 1.26          | 59.40                               | 10                                          | 2,000                             | 6.1                               | 610(2,000)           |

- Remarks 1) Size range : UL 30-16AWG, CSA 30-16AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 80°C, single-wire in air



1-6 Lead Wire  
Lead Free Heat-resistant PVC insulated wire

UL Style No.1275, 1276 CSA Type AWM

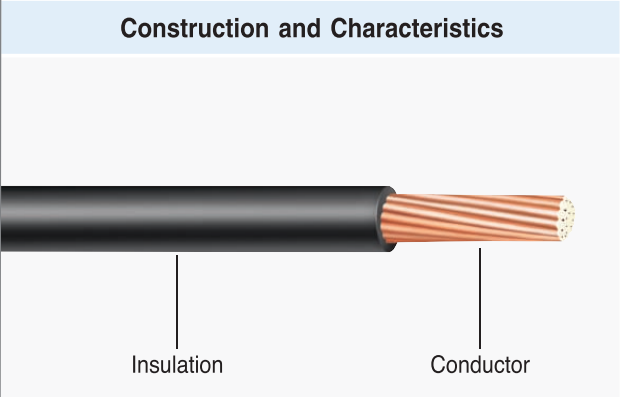
- Rating UL : 600V, 105°C / CSA : 600V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

Application

Internal wiring of refrigerating and air-conditioning equipments.

Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Marking Bunched stranded conductor is only possible.
4. Excellent Insulation resistance at high temperature and dielectric strength.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

1275(1276) E52853 VW-1 AWM 105C LL57184 CSA AWM I A 105C 600V FT1 AWG NO. LS Cable -F- LF

| UL Style | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| 1275     | 18         | 41/0.160              | 1.18          | 1.60                   | 4.38          | 23.20                               | 93                                          | 2,000                             | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 1.60                   | 4.69          | 14.60                               | 83                                          | 2,000                             | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 1.60                   | 5.08          | 8.96                                | 72                                          | 2,000                             | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 1.60                   | 5.56          | 5.64                                | 61                                          | 2,000                             | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 1.60                   | 6.20          | 3.55                                | 54                                          | 2,000                             | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 2.00                   | 5.88          | 8.96                                | 72                                          | 2,000                             | 305(1,000)           |
| 1276     | 12         | 65/0.254              | 2.36          | 2.00                   | 6.36          | 5.64                                | 61                                          | 2,000                             | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 2.00                   | 7.00          | 3.55                                | 54                                          | 2,000                             | 305(1,000)           |

- Remarks 1) Size range : 1275 : UL 18-10AWG, 1276 : UL 14-10AWG, CSA 18-10AWG



1-7 Lead Wire  
Lead Free Heat-resistant PVC insulated wire

UL Style No.1283,1284 CSA Type TEW

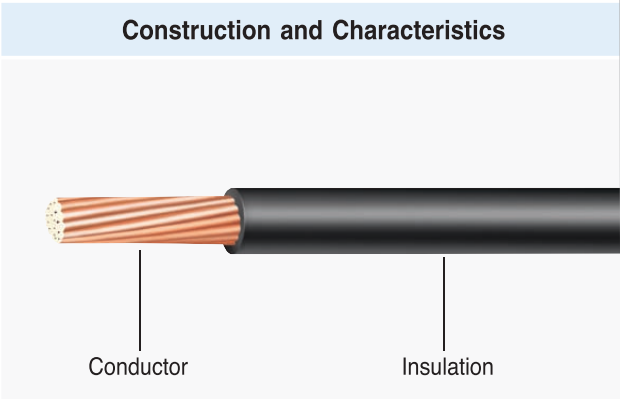
- Rating UL : 600V, 105°C / CSA : 600V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

Application

Internal wiring of main electrical equipments requiring a large current, or for power circuits.

Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

1283(1284) E52853 VW-1  AWM 105C LL33911 CSA TEW 105C FT1 AWG NO. LS Cable -F- LF

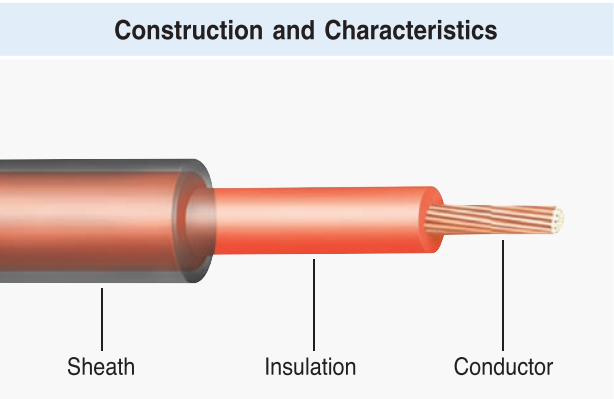
| UL Style | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| 1283     | 8          | 7/24/0.254            | 4.31          | 1.64                   | 7.59          | 2.37                                | 15                                          | 2,000                             | 67.9                              | 153(500)             |
|          | 6          | 7/38/0.254            | 5.45          | 1.64                   | 8.73          | 1.49                                | 15                                          | 2,000                             | 90.8                              | 153(500)             |
|          | 4          | 7/60/0.254            | 6.81          | 1.64                   | 10.09         | 0.95                                | 12                                          | 2,000                             | 121.0                             | 153(500)             |
|          | 2          | 19/35/0.254           | 8.67          | 1.64                   | 11.95         | 0.60                                | 10                                          | 2,000                             | 166.0                             | 153(500)             |
| 1284     | 1          | 19/44/0.254           | 9.72          | 2.30                   | 14.32         | 0.48                                | 10                                          | 2,000                             | 193.0                             | 153(500)             |
|          | 1/0        | 19/55/0.254           | 10.87         | 2.30                   | 15.47         | 0.38                                | 10                                          | 2,000                             | 221.0                             | 153(500)             |
|          | 2/0        | 19/70/0.254           | 12.26         | 2.30                   | 16.86         | 0.30                                | 10                                          | 2,000                             | 275.0                             | 153(500)             |
|          | 3/0        | 19/88/0.254           | 13.75         | 2.30                   | 18.35         | 0.24                                | 10                                          | 2,000                             | 303.0                             | 153(500)             |
|          | 4/0        | 37/57/0.254           | 15.40         | 2.35                   | 20.10         | 0.19                                | 10                                          | 2,000                             | 353.0                             | 153(500)             |

- Remarks 1) Size range : 1283 : UL 8-2AWG, 1284 : UL 1-4/0AWG, CSA 8-4/0AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air
- 3) UL1283 and UL1284 cover the construction and characteristics of UL1019 and UL1020, so use of UL1283 and UL1284 is recommended.



1-8 Lead Wire  
Lead Free Heat-resistant PVC insulated, Nylon sheath wire

UL Style No.1316 or 1452 CSA Type TR-64



- Rating UL : 30V, 105°C or 1,000V, 90°C / CSA : 300V (Peak 600V), 90°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

Application

Internal wiring of electrical and electronic equipments (Secondary circuits lead wire).

Features

1. Standard : For both UL and CSA
2. Excellent resistance to abrasion and hydrocarbons.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

Marking

1316 105C 600V OR 1452 90C 1000V E52853  AWM LL33908 CSA TR-64 90C FT2 AWG NO. LS Cable LF

| Type     | Conductor  |                       |               | Insulation             |               | Sheath                 |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 24         | 11/0.160              | 0.61          | 0.38                   | 1.37          | 0.12                   | 1.61          | 94.20                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.38                   | 1.52          | 0.12                   | 1.76          | 59.40                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.38                   | 1.70          | 0.12                   | 1.94          | 36.70                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.38                   | 1.94          | 0.12                   | 2.18          | 23.20                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.38                   | 2.25          | 0.12                   | 2.49          | 14.60                               | 15                                          | 2,000                             | 305(1,000)           |
| Solid    | 24         | 1/0.511               | 0.51          | 0.38                   | 1.27          | 0.12                   | 1.51          | 89.30                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.38                   | 1.40          | 0.12                   | 1.64          | 56.40                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.38                   | 1.57          | 0.12                   | 1.81          | 35.20                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.38                   | 1.78          | 0.12                   | 2.02          | 22.20                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.38                   | 2.05          | 0.12                   | 2.29          | 14.00                               | 15                                          | 2,000                             | 305(1,000)           |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.38                   | 1.24          | 0.12                   | 1.48          | 150.00                              | 15                                          | 2,000                             | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.38                   | 1.37          | 0.12                   | 1.61          | 94.20                               | 15                                          | 2,000                             | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.38                   | 1.52          | 0.12                   | 1.76          | 59.40                               | 15                                          | 2,000                             | 610(2,000)           |

- Remarks 1) Size range : UL 26-12AWG, CSA 26-16AWG





1-9 Lead Wire  
Lead Free Heat-resistant PVC insulated wire

UL Style No.1569 CSA Type TR-64

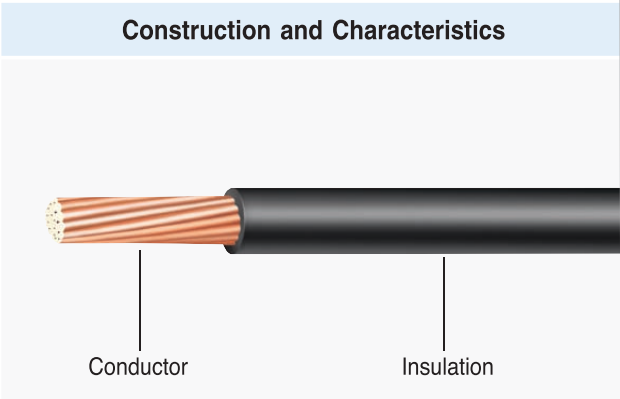
- Rating UL : 300V, 105°C / CSA : 300V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

Application

Internal wiring of electrical and electronic equipments.  
600 Volts peak for electronic use only.

Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

1569 E52853 VW-1  AWM 105C LL57184 CSA AWM I A 105C 300V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.40                   | 1.11          | 381.00                              | 15                                          | 2,000                             | 2.7                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.40                   | 1.18          | 239.00                              | 15                                          | 2,000                             | 3.6                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 150.00                              | 15                                          | 2,000                             | 4.8                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.40                   | 1.41          | 94.20                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.40                   | 1.56          | 59.40                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.40                   | 1.74          | 36.70                               | 15                                          | 2,000                             | 11.2                              | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.40                   | 1.98          | 23.20                               | 15                                          | 2,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.40                   | 2.29          | 14.60                               | 15                                          | 2,000                             | 20.0                              | 305(1,000)           |
| Solid    | 30         | 1/0.254               | 0.26          | 0.40                   | 1.06          | 361.00                              | 15                                          | 2,000                             | 2.7                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.40                   | 1.12          | 227.00                              | 15                                          | 2,000                             | 3.6                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.40                   | 1.20          | 143.00                              | 15                                          | 2,000                             | 4.8                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.40                   | 1.31          | 89.30                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.40                   | 1.44          | 56.40                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.40                   | 1.61          | 35.20                               | 15                                          | 2,000                             | 11.2                              | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.40                   | 1.82          | 22.20                               | 15                                          | 2,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.40                   | 2.09          | 14.00                               | 15                                          | 2,000                             | 20.0                              | 305(1,000)           |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 150.00                              | 15                                          | 2,000                             | 4.8                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.40                   | 1.41          | 94.20                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.40                   | 1.56          | 59.40                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |

- Remarks 1) Size range : UL 30-10AWG, CSA 26-10AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air



1-10 Lead Wire  
Lead Free PVC insulated wire

UL Style No.1571

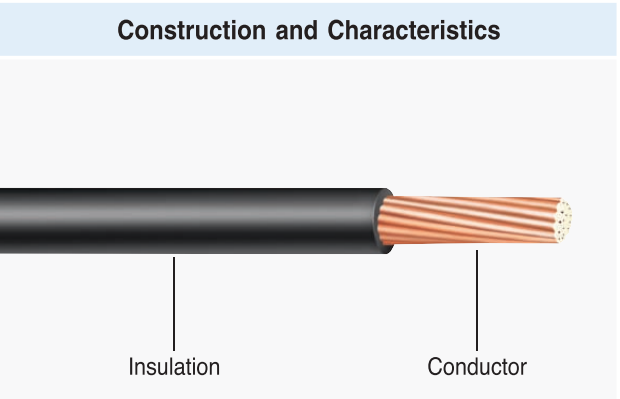
- Rating UL : 30V, 80°C
- Standard UL : UL Subject 758

Application

Internal wiring of small-scale electronic equipments such as mini cassettes, radio receivers and cameras.

Features

1. Flame retardant : UL VW-1, Material Control Law -F-
2. Small diameter saves space.
3. Wire for moving section as these wires are very soft.
4. Can be produced with or without cross-linking.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

1571 E52853 VW-1  AWM AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.25                   | 0.81          | 381.00                              | 15                                          | 500                               | 1,220(4,000)         |
|          | 28         | 7/0.127               | 0.38          | 0.25                   | 0.88          | 239.00                              | 15                                          | 500                               | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.25                   | 0.98          | 150.00                              | 15                                          | 500                               | 1,220(4,000)         |
|          | 24         | 11/0.160              | 0.61          | 0.25                   | 1.11          | 94.20                               | 15                                          | 500                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.35                   | 1.46          | 59.40                               | 15                                          | 500                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.40                   | 1.74          | 36.70                               | 15                                          | 500                               | 610(2,000)           |
| Solid    | 30         | 1/0.254               | 0.26          | 0.25                   | 0.76          | 361.00                              | 15                                          | 500                               | 1,220(4,000)         |
|          | 28         | 1/0.320               | 0.32          | 0.25                   | 0.82          | 227.00                              | 15                                          | 500                               | 1,220(4,000)         |
|          | 26         | 1/0.404               | 0.40          | 0.25                   | 0.90          | 143.00                              | 15                                          | 500                               | 1,220(4,000)         |
|          | 24         | 1/0.511               | 0.51          | 0.25                   | 1.01          | 89.30                               | 15                                          | 500                               | 610(2,000)           |
| TA-SC    | 22         | 1/0.643               | 0.64          | 0.35                   | 1.34          | 56.40                               | 15                                          | 500                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.25                   | 0.88          | 239.00                              | 15                                          | 2,000                             | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.25                   | 0.98          | 150.00                              | 15                                          | 2,000                             | 1,220(4,000)         |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.25                   | 1.11          | 94.20                               | 15                                          | 2,000                             | 610(2,000)           |

- Remarks 1) Size range : Min. 50AWG  
2) Marking size : Not less than 28AWG



# 1-11 Lead Wire

Lead Free Heat-resistant PVC double-insulated wire

## UL Style No.1617 CSA Type TEW

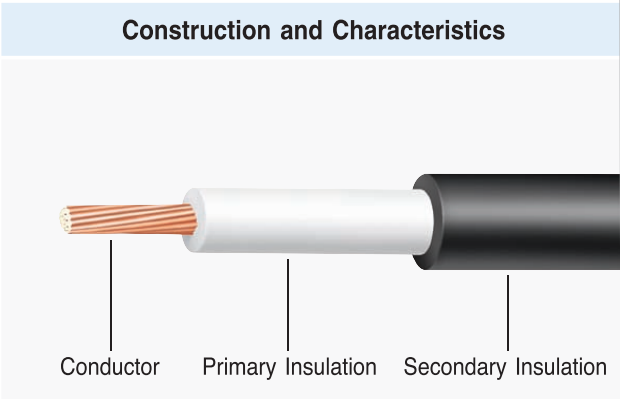
- Rating UL : 600V, 105°C / CSA : 600V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

### Application

Internal wiring of audio/video equipments.

### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. The thickness of every layers is more than 0.4mm, and effective on the European Standard and the Electrical Appliances and Material Control Law.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



### Marking

1617 E52853 VW-1  AWM 105C LL33911 CSA TEW 105C FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Sheath                 |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.79                   | 2.06          | 0.24                   | 2.54          | 150.00                              | 55                                          | 2,000                             | 11.2                              | 305(1,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.79                   | 2.19          | 0.24                   | 2.67          | 94.20                               | 42                                          | 2,000                             | 12.6                              | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.79                   | 2.34          | 0.24                   | 2.82          | 59.40                               | 36                                          | 2,000                             | 14.6                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.79                   | 2.52          | 0.48                   | 3.48          | 36.70                               | 31                                          | 2,000                             | 17.2                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.79                   | 2.76          | 0.48                   | 3.72          | 23.20                               | 27                                          | 2,000                             | 21.9                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.79                   | 3.07          | 0.48                   | 4.03          | 14.60                               | 23                                          | 2,000                             | 28.9                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.79                   | 3.46          | 0.48                   | 4.42          | 8.96                                | 18                                          | 2,000                             | 37.6                              | 305(1,000)           |
| Solid    | 26         | 1/0.404               | 0.40          | 0.79                   | 1.98          | 0.24                   | 2.46          | 143.00                              | 55                                          | 2,000                             | 10.6                              | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.79                   | 2.09          | 0.24                   | 2.57          | 89.30                               | 42                                          | 2,000                             | 11.8                              | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.79                   | 2.22          | 0.48                   | 3.18          | 56.40                               | 40                                          | 2,000                             | 13.6                              | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.79                   | 2.39          | 0.48                   | 3.35          | 35.20                               | 34                                          | 2,000                             | 16.3                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.79                   | 2.60          | 0.48                   | 3.56          | 22.20                               | 30                                          | 2,000                             | 20.3                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.79                   | 2.87          | 0.48                   | 3.83          | 14.00                               | 26                                          | 2,000                             | 26.0                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.79                   | 3.21          | 0.48                   | 4.17          | 8.78                                | 22                                          | 2,000                             | 34.7                              | 305(1,000)           |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.79                   | 2.19          | 0.24                   | 2.67          | 94.20                               | 42                                          | 2,000                             | 12.4                              | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.79                   | 2.34          | 0.24                   | 2.82          | 59.40                               | 36                                          | 2,000                             | 15.0                              | 305(1,000)           |

- Remarks 1) Size range : UL 28-9AWG, CSA 26-10AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air  
3) Standard color of primary insulation : White



# 1-12 Lead Wire

Lead Free Heat-resistant PVC double-insulated wire

## UL Style No.1618

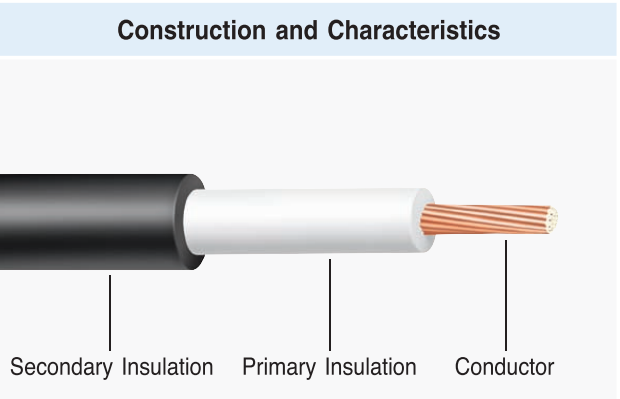
- Rating UL : 300V, 80°C
- Standard UL : UL Subject 758

### Application

Internal wiring of audio/video equipments.

### Features

1. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
2. The thickness of every layers is more than 0.4mm, and effective on the European Standard and the Electrical Appliances and Material Control Law.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



### Marking

1618 E52853 VW-1  AWM AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Sheath                 |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 0.51                   | 2.30          | 150.00                              | 15                                          | 2,000                             | 7.3                               | 305(1,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.40                   | 1.41          | 0.51                   | 2.43          | 94.20                               | 15                                          | 2,000                             | 8.6                               | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.40                   | 1.56          | 0.51                   | 2.58          | 59.40                               | 15                                          | 2,000                             | 10.2                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.40                   | 1.74          | 0.51                   | 2.76          | 36.70                               | 15                                          | 2,000                             | 12.7                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.40                   | 1.98          | 0.51                   | 3.00          | 23.20                               | 15                                          | 2,000                             | 16.9                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.40                   | 2.29          | 0.51                   | 3.31          | 14.60                               | 15                                          | 2,000                             | 22.9                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.40                   | 2.60          | 0.51                   | 3.62          | 8.96                                | 15                                          | 2,000                             | 30.0                              | 305(1,000)           |
| Solid    | 26         | 1/0.404               | 0.40          | 0.40                   | 1.20          | 0.51                   | 2.22          | 143.00                              | 15                                          | 2,000                             | 6.8                               | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.40                   | 1.31          | 0.51                   | 2.33          | 89.30                               | 15                                          | 2,000                             | 8.0                               | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.40                   | 1.44          | 0.51                   | 2.46          | 56.40                               | 15                                          | 2,000                             | 9.6                               | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.40                   | 1.61          | 0.51                   | 2.63          | 35.20                               | 15                                          | 2,000                             | 12.0                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.40                   | 1.82          | 0.51                   | 2.84          | 22.20                               | 15                                          | 2,000                             | 15.6                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.40                   | 2.09          | 0.51                   | 3.11          | 14.00                               | 15                                          | 2,000                             | 21.0                              | 305(1,000)           |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.40                   | 1.41          | 0.51                   | 2.43          | 94.20                               | 15                                          | 2,000                             | 12.4                              | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.40                   | 1.56          | 0.51                   | 2.58          | 59.40                               | 15                                          | 2,000                             | 15.0                              | 305(1,000)           |

- Remarks 1) Size range : UL 28-16AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 80°C, single-wire in air  
3) Standard color of primary insulation : White





## 2-1 Irradiated Wire

Lead Free Irradiated XLPVC insulated wire

### UL Style No.1429 CSA Type AWM

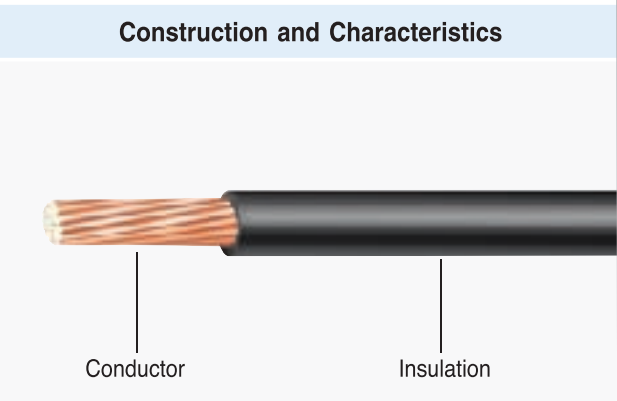
- Rating     UL : 150V, 80°C / CSA : 150V, 80°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

Internal wiring of electrical and electronic equipments which are mainly small.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. Small diameter saves space.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1429 E52853 VW-1  AWM LL57184 CSA AWM I A 80C 150V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.27                   | 0.85          | 381.00                              | 15                                          | 2,000                             | 2.0                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.27                   | 0.92          | 239.00                              | 15                                          | 2,000                             | 2.6                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.27                   | 1.02          | 150.00                              | 15                                          | 2,000                             | 3.5                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.27                   | 1.15          | 94.20                               | 15                                          | 2,000                             | 4.7                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.27                   | 1.30          | 59.40                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.27                   | 1.48          | 36.70                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.27                   | 1.72          | 23.20                               | 15                                          | 2,000                             | 11.5                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.27                   | 2.03          | 14.60                               | 15                                          | 2,000                             | 15.4                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 30         | 1/0.254               | 0.26          | 0.27                   | 0.80          | 361.00                              | 15                                          | 2,000                             | 2.0                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.27                   | 0.86          | 227.00                              | 15                                          | 2,000                             | 2.6                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.27                   | 0.94          | 143.00                              | 15                                          | 2,000                             | 3.5                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.27                   | 1.05          | 89.30                               | 15                                          | 2,000                             | 4.7                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.27                   | 1.18          | 56.40                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.27                   | 1.35          | 35.20                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.27                   | 1.56          | 22.20                               | 15                                          | 2,000                             | 11.5                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.27                   | 1.83          | 14.00                               | 15                                          | 2,000                             | 15.4                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.27                   | 1.02          | 150.00                              | 15                                          | 2,000                             | 3.5                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.27                   | 1.15          | 94.20                               | 15                                          | 2,000                             | 4.7                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.27                   | 1.30          | 59.40                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |

- Remarks   1) Size range : UL 32-16AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 80°C, single-wire in air

## 2-2 Irradiated Wire

Lead Free Irradiated XLPVC insulated wire



### UL Style No.1430 CSA Type REW(XLPVC)

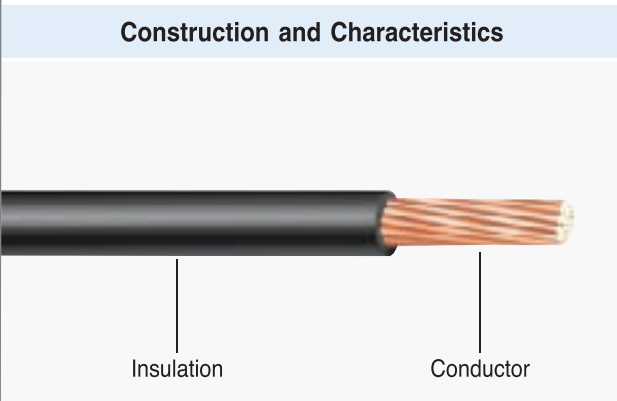
- Rating     UL : 300V, 105°C / CSA : 300V, 105°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.127

#### Application

Internal wiring of electrical and electronic equipments which are mainly small (Wiring inside high temperature units such as dryers, hair curlers, rice warmers and toasters. Transformer lead wires, wiring of light fixtures).

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. Excellent mechanical strength, oil-resistance, chemical-resistance.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1430 E52853 VW-1  AWM 105C LL33911 CSA REW(XLPVC) FT1 105C 300V AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.42                   | 1.15          | 381.00                              | 15                                          | 2,000                             | 2.7                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.42                   | 1.22          | 239.00                              | 15                                          | 2,000                             | 3.6                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.42                   | 1.32          | 150.00                              | 15                                          | 2,000                             | 4.8                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.42                   | 1.45          | 94.20                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.42                   | 1.60          | 59.40                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.42                   | 1.78          | 36.70                               | 15                                          | 2,000                             | 11.2                              | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.42                   | 2.02          | 23.20                               | 15                                          | 2,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.42                   | 2.33          | 14.60                               | 15                                          | 2,000                             | 20.0                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 30         | 1/0.254               | 0.26          | 0.42                   | 1.10          | 361.00                              | 15                                          | 2,000                             | 2.7                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.42                   | 1.16          | 227.00                              | 15                                          | 2,000                             | 3.6                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.42                   | 1.24          | 143.00                              | 15                                          | 2,000                             | 4.8                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.42                   | 1.35          | 89.30                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.42                   | 1.48          | 56.40                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.42                   | 1.65          | 35.20                               | 15                                          | 2,000                             | 11.2                              | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.42                   | 1.86          | 22.20                               | 15                                          | 2,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.42                   | 2.13          | 14.00                               | 15                                          | 2,000                             | 20.0                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.42                   | 1.32          | 150.00                              | 15                                          | 2,000                             | 4.8                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.42                   | 1.45          | 94.20                               | 15                                          | 2,000                             | 6.4                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.42                   | 1.60          | 59.40                               | 15                                          | 2,000                             | 8.5                               | 610(2,000)           |

- Remarks   1) Size range : UL 30-16AWG, CSA 26-16AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air



## 2-3 Irradiated Wire

Lead Free Irradiated XLPVC insulated wire

### UL Style No.1431 CSA Type REW(XLPVC)

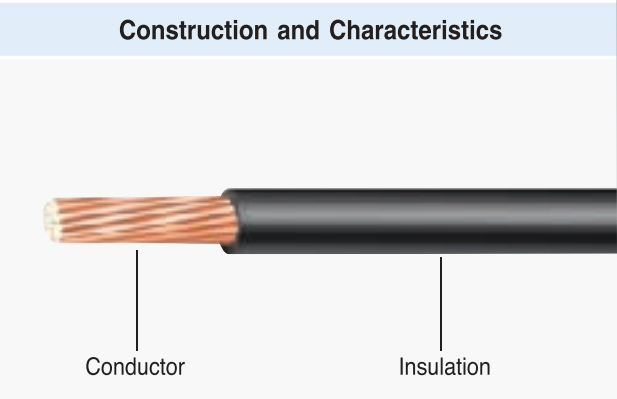
- Rating UL : 600V, 105°C / CSA : 600V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

#### Application

Internal wiring of electrical and electronic equipments which are mainly small (Wiring inside high temperature units such as dryers, hair curlers, rice warmers and toasters).

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. Excellent mechanical strength, oil-resistance, chemical-resistance.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1431 E52853 VW-1  AWM 105C LL33911 CSA REW(XLPVC) FT1 105C 600V AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.81                   | 1.93          | 381.00                              | 15                                          | 2,000                             | 3.4                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.81                   | 2.00          | 239.00                              | 15                                          | 2,000                             | 4.4                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.81                   | 2.10          | 150.00                              | 15                                          | 2,000                             | 5.8                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.81                   | 2.23          | 94.20                               | 15                                          | 2,000                             | 7.6                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.81                   | 2.38          | 59.40                               | 15                                          | 2,000                             | 10.0                              | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.81                   | 2.56          | 36.70                               | 15                                          | 2,000                             | 13.1                              | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.81                   | 2.80          | 23.20                               | 15                                          | 2,000                             | 17.2                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.81                   | 3.11          | 14.60                               | 15                                          | 2,000                             | 22.3                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.81                   | 3.50          | 36.70                               | 15                                          | 2,000                             | 29.6                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.81                   | 3.98          | 23.20                               | 15                                          | 2,000                             | 38.8                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.81                   | 4.62          | 14.60                               | 15                                          | 2,000                             | 52.4                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 30         | 1/0.254               | 0.26          | 0.81                   | 1.88          | 361.00                              | 15                                          | 2,000                             | 3.4                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.81                   | 1.94          | 227.00                              | 15                                          | 2,000                             | 4.4                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.81                   | 2.02          | 143.00                              | 15                                          | 2,000                             | 5.8                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.81                   | 2.13          | 89.30                               | 15                                          | 2,000                             | 7.6                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.81                   | 2.26          | 56.40                               | 15                                          | 2,000                             | 10.0                              | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.81                   | 2.43          | 35.20                               | 15                                          | 2,000                             | 13.1                              | 610(2,000)           |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.81                   | 2.10          | 150.00                              | 15                                          | 2,000                             | 5.8                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.81                   | 2.23          | 94.20                               | 15                                          | 2,000                             | 7.6                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.81                   | 2.38          | 59.40                               | 15                                          | 2,000                             | 10.0                              | 610(2,000)           |

- Remarks 1) Size range : UL 30-1KMCM, CSA 24-4AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air



## 2-4 Irradiated Wire

Lead Free Irradiated XLPVC insulated wire



### UL Style No. 3443

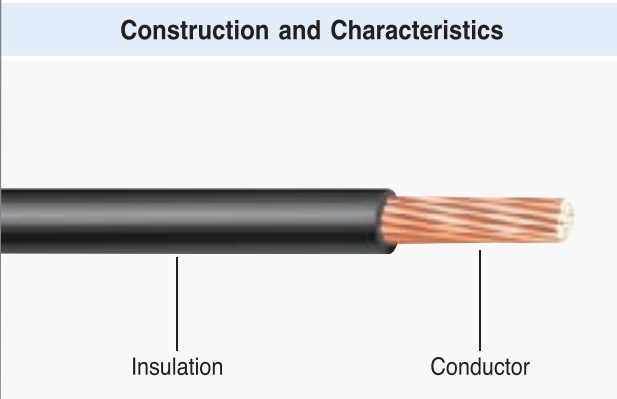
- Rating UL : 300V, 105°C
- Standard UL : UL Subject 758

#### Application

Internal wiring of small-scale electronic equipment such as notebook computer, CDP, DVD, and mini cassettes.

#### Features

1. Flame retardant : UL VW-1, Material Control Law -F-
2. Small diameter saves space.
3. Suitable for moving parts due to excellent flexibility.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

3443 E52853 VW-1  AWM 150C 300V AWG NO. LS Cable -F-

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.27                   | 0.85          | 381.00                              | 10                                          | 2,000                             | 1,220(4,000)         |
|          | 28         | 7/0.127               | 0.38          | 0.27                   | 0.92          | 239.00                              | 10                                          | 2,000                             | 1,220(4,000)         |
|          | 26         | 19/0.102              | 0.51          | 0.27                   | 1.05          | 150.00                              | 10                                          | 2,000                             | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.27                   | 1.02          | 150.00                              | 10                                          | 2,000                             | 610(2,000)           |
|          | 24         | 19/0.127              | 0.64          | 0.27                   | 1.18          | 94.20                               | 10                                          | 2,000                             | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.27                   | 1.15          | 94.20                               | 10                                          | 2,000                             | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.27                   | 1.15          | 94.20                               | 10                                          | 2,000                             | 610(2,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                      |
| Solid    | 30         | 1/0.254               | 0.26          | 0.27                   | 0.80          | 361.00                              | 10                                          | 2,000                             | 1,220(4,000)         |
|          | 28         | 1/0.320               | 0.32          | 0.27                   | 0.86          | 227.00                              | 10                                          | 2,000                             | 1,220(4,000)         |
|          | 26         | 1/0.404               | 0.40          | 0.27                   | 0.94          | 143.00                              | 10                                          | 2,000                             | 1,220(4,000)         |
|          | 24         | 1/0.511               | 0.51          | 0.27                   | 1.05          | 89.30                               | 10                                          | 2,000                             | 610(2,000)           |

- Remarks 1) Size range : UL 30-10AWG



## 2-5 Irradiated Wire

Lead Free Irradiated XLPVC double-insulated wire

### UL Style No.1672 CSA Type AWM

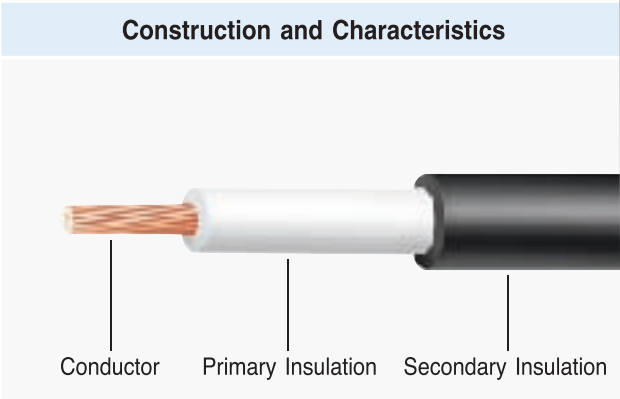
- Rating UL : 300V, 105°C / CSA : 300V, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

Internal wiring of audio/video equipments.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. The minimum thickness of every layers is more than 0.4mm, and effective on the European Standard and the Electrical Appliances and Material Control Law.
4. Excellent abrasion resistance and mechanical strength due to radiation cross-linking.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

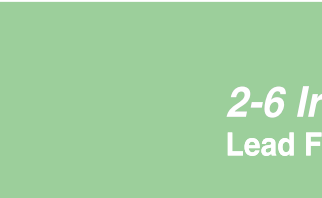


#### Marking

1672 E52853 VW-1  AWM 105C LL57184 CSA AWM I A 105C 300V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Primary                |               | Secondary Insulation   |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.50                   | 1.48          | 0.50                   | 2.48          | 150.00                              | 15                                          | 4,000                             | 305(1,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.50                   | 1.61          | 0.50                   | 2.61          | 94.20                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.50                   | 1.76          | 0.50                   | 2.76          | 59.40                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.50                   | 1.94          | 0.50                   | 2.94          | 36.70                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.50                   | 2.18          | 0.50                   | 3.18          | 23.20                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.50                   | 2.49          | 0.50                   | 3.49          | 14.60                               | 15                                          | 4,000                             | 305(1,000)           |
|          |            |                       |               |                        |               |                        |               |                                     |                                             |                                   |                      |
| Solid    | 26         | 1/0.404               | 0.40          | 0.50                   | 1.40          | 0.50                   | 2.40          | 143.00                              | 15                                          | 4,000                             | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.50                   | 1.51          | 0.50                   | 2.51          | 89.30                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.50                   | 1.64          | 0.50                   | 2.64          | 56.40                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.50                   | 1.81          | 0.50                   | 2.81          | 35.20                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.50                   | 2.02          | 0.50                   | 3.02          | 22.20                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.50                   | 2.29          | 0.50                   | 3.29          | 14.00                               | 15                                          | 4,000                             | 305(1,000)           |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.50                   | 1.61          | 0.50                   | 2.61          | 94.20                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.50                   | 1.76          | 0.50                   | 2.76          | 59.40                               | 15                                          | 4,000                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.50                   | 1.96          | 0.50                   | 2.96          | 36.70                               | 15                                          | 4,000                             | 305(1,000)           |

- Remarks 1) Size range : UL 30-16AWG, CSA 26-10AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air  
3) Standard color of the primary insulation : White



## 2-6 Irradiated Wire

Lead Free Irradiated XLPVC double-insulated wire

### UL Style No.1673

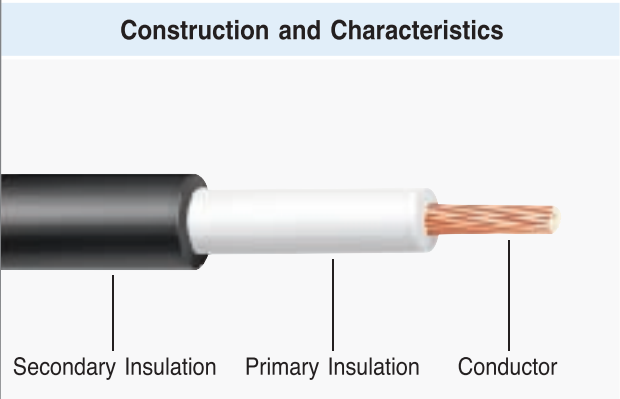
- Rating UL : 600V, 105°C
- Standard UL : UL Subject 758

#### Application

Internal wiring of electronic equipments such as a video.

#### Features

1. Flame retardant : UL VW-1, Material Control Law -F-
2. The minimum thickness of every layers is more than 0.4mm, and effective on the European Standard and the Electrical Appliances and Material Control Law.
3. Excellent abrasion resistance and mechanical strength due to radiation cross-linking.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1673 E52853 VW-1  AWM 105C 600V AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Primary                |               | Secondary Insulation   |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 22         | 17/0.160              | 0.76          | 0.81                   | 2.38          | 0.50                   | 3.38          | 59.40                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.81                   | 2.56          | 0.50                   | 3.56          | 36.70                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.81                   | 2.80          | 0.50                   | 3.80          | 23.20                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.81                   | 3.11          | 0.50                   | 4.11          | 14.60                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.81                   | 3.50          | 0.50                   | 4.50          | 8.96                                | 15                                          | 2,000                             | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.81                   | 3.98          | 0.50                   | 4.98          | 5.64                                | 15                                          | 2,000                             | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.81                   | 4.62          | 0.50                   | 5.62          | 3.55                                | 15                                          | 2,000                             | 305(1,000)           |
|          |            |                       |               |                        |               |                        |               |                                     |                                             |                                   |                      |
|          | 8          | 118/0.254             | 3.56          | 0.81                   | 5.08          | 0.50                   | 6.08          | 2.78                                | 15                                          | 2,000                             | 305(1,000)           |
| Solid    | 22         | 1/0.643               | 0.64          | 0.81                   | 2.26          | 0.50                   | 3.26          | 56.40                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.81                   | 2.43          | 0.50                   | 3.43          | 35.20                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.81                   | 2.64          | 0.50                   | 3.64          | 22.20                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.81                   | 2.91          | 0.50                   | 3.91          | 14.00                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.81                   | 3.25          | 0.50                   | 4.25          | 8.78                                | 15                                          | 2,000                             | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.81                   | 3.67          | 0.50                   | 4.67          | 5.53                                | 15                                          | 2,000                             | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.81                   | 4.21          | 0.50                   | 5.21          | 3.48                                | 15                                          | 2,000                             | 305(1,000)           |
|          |            |                       |               |                        |               |                        |               |                                     |                                             |                                   |                      |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.81                   | 2.23          | 0.50                   | 3.23          | 94.20                               | 15                                          | 2,000                             | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.81                   | 2.38          | 0.50                   | 3.38          | 59.40                               | 15                                          | 2,000                             | 305(1,000)           |

- Remarks 1) Size range : UL 30-4/0AWG  
2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air  
3) Standard color of the primary insulation : White





## 2-7 Irradiated Wire

Lead Free Heat-resistant irradiated XLPE insulated wire

### UL Style No.3265

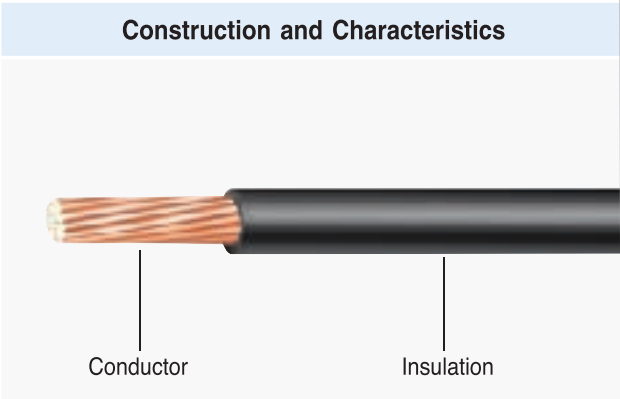
- Rating     UL : 150V, 125°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of electrical and electronic equipments.
2. Internal wiring of hair dryers and small electric heaters.

#### Features

1. Flame retardant : UL VW-1, Material Control Law -F-
2. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
3. Small diameter saves space.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

3265 E52853 VW-1  AWM 125C 150V AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.28                   | 0.87          | 381.00                              | 50                                          | 2,000                             | 2.3                               | 1,220(4,000)         |
|          | 28         | 7/0.127               | 0.38          | 0.28                   | 0.94          | 239.00                              | 50                                          | 2,000                             | 2.9                               | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.28                   | 1.04          | 150.00                              | 50                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.28                   | 1.17          | 94.20                               | 50                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.28                   | 1.32          | 59.40                               | 50                                          | 2,000                             | 7.3                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.28                   | 1.50          | 36.70                               | 50                                          | 2,000                             | 9.7                               | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.28                   | 1.74          | 23.20                               | 50                                          | 2,000                             | 13.1                              | 610(2,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.28                   | 2.05          | 14.60                               | 50                                          | 2,000                             | 17.6                              | 305(1,000)           |
| Solid    | 30         | 1/0.254               | 0.26          | 0.28                   | 0.82          | 361.00                              | 50                                          | 2,000                             | 2.3                               | 1,220(4,000)         |
|          | 28         | 1/0.320               | 0.32          | 0.28                   | 0.88          | 227.00                              | 50                                          | 2,000                             | 2.9                               | 1,220(4,000)         |
|          | 26         | 1/0.404               | 0.40          | 0.28                   | 0.96          | 143.00                              | 50                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.28                   | 1.07          | 89.30                               | 50                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.28                   | 1.20          | 56.40                               | 50                                          | 2,000                             | 7.3                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.28                   | 1.37          | 35.20                               | 50                                          | 2,000                             | 9.7                               | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.28                   | 1.58          | 22.20                               | 50                                          | 2,000                             | 13.1                              | 610(2,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.28                   | 1.85          | 14.00                               | 50                                          | 2,000                             | 17.6                              | 305(1,000)           |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.28                   | 1.04          | 150.00                              | 50                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.28                   | 1.17          | 94.20                               | 50                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.28                   | 1.32          | 59.40                               | 50                                          | 2,000                             | 7.3                               | 610(2,000)           |

- Remarks   1) Size range : UL 32-16AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 125°C, single-wire in air

## 2-8 Irradiated Wire

Lead Free Heat-resistant irradiated XLPE insulated wire



### UL Style No.3266 CSA Type CL1252/AWM

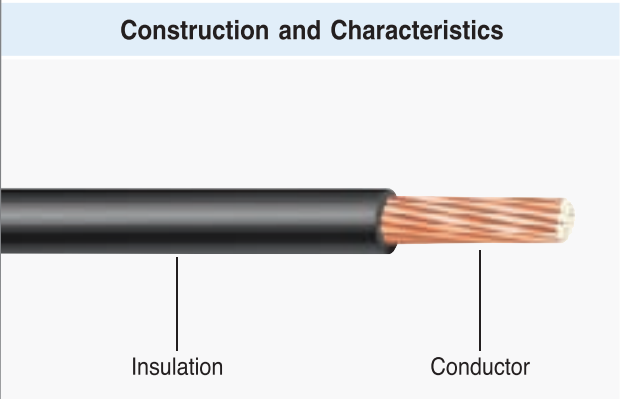
- Rating     UL : 300V, 125°C / CSA : 300V, 125°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

1. Internal wiring of electrical and electronic equipments.
2. Internal wiring of hair dryers and small electric heaters.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

3266 E52853 VW-1  AWM 125C LL57183 CSA CL1252 XLPE 125C 300V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.42                   | 1.22          | 239.00                              | 50                                          | 2,000                             | 4.1                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.42                   | 1.32          | 150.00                              | 50                                          | 2,000                             | 5.5                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.42                   | 1.45          | 94.20                               | 50                                          | 2,000                             | 7.3                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.42                   | 1.60          | 59.40                               | 50                                          | 2,000                             | 9.7                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.42                   | 1.78          | 36.70                               | 50                                          | 2,000                             | 12.8                              | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.42                   | 2.02          | 23.20                               | 50                                          | 2,000                             | 17.1                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.42                   | 2.33          | 14.60                               | 50                                          | 2,000                             | 22.8                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.42                   | 2.72          | 8.96                                | 50                                          | 2,000                             | 30.3                              | 305(1,000)           |
|          | 12         | 41/0.254              | 1.88          | 0.42                   | 2.72          | 8.96                                | 50                                          | 2,000                             | 30.3                              | 305(1,000)           |
| Solid    | 28         | 1/0.320               | 0.32          | 0.42                   | 1.16          | 227.00                              | 50                                          | 2,000                             | 4.1                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.42                   | 1.24          | 143.00                              | 50                                          | 2,000                             | 5.5                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.42                   | 1.35          | 89.30                               | 50                                          | 2,000                             | 7.3                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.42                   | 1.48          | 56.40                               | 50                                          | 2,000                             | 9.7                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.42                   | 1.65          | 35.20                               | 50                                          | 2,000                             | 12.8                              | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.42                   | 1.86          | 22.20                               | 50                                          | 2,000                             | 17.1                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.42                   | 2.13          | 14.00                               | 50                                          | 2,000                             | 22.8                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.42                   | 2.47          | 8.78                                | 50                                          | 2,000                             | 30.3                              | 305(1,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.42                   | 1.22          | 239.00                              | 50                                          | 2,000                             | 4.1                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.42                   | 1.32          | 150.00                              | 50                                          | 2,000                             | 5.5                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.42                   | 1.45          | 94.20                               | 50                                          | 2,000                             | 7.3                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.42                   | 1.60          | 59.40                               | 50                                          | 2,000                             | 9.7                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.42                   | 1.80          | 36.70                               | 50                                          | 2,000                             | 12.8                              | 610(2,000)           |
|          | 18         | 7/0.404               | 1.21          | 0.42                   | 2.05          | 23.20                               | 50                                          | 2,000                             | 17.1                              | 305(1,000)           |

- Remarks   1) Size range : UL 32-10AWG, CSA CL1252 22-16AWG, AWM 32-10AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 125°C, single-wire in air



## 2-9 Irradiated Wire

Lead Free Heat-resistant irradiated XLPE insulated wire

### UL Style No.3173 CSA Type CL1251

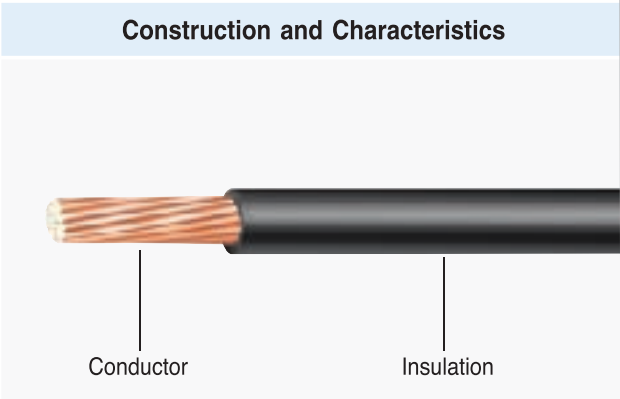
- Rating UL : 600V, 125°C / CSA : 600V, 125°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

#### Application

1. Internal wiring of electrical and electronic equipments.
2. Lead wires of motors.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

3173 E52853 VW-1  AWM 125C 600V LL57183 CSA CL1251 XLPE 125C 600V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 22         | 17/0.160              | 0.76          | 0.81                   | 2.38          | 59.40                               | 50                                          | 2,000                             | 13.5                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.81                   | 2.56          | 36.70                               | 50                                          | 2,000                             | 17.6                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.81                   | 2.80          | 23.20                               | 50                                          | 2,000                             | 23.2                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.81                   | 3.11          | 14.60                               | 50                                          | 2,000                             | 30.7                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.81                   | 3.50          | 8.96                                | 50                                          | 2,000                             | 41.0                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.81                   | 3.98          | 5.64                                | 50                                          | 2,000                             | 54.8                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.81                   | 4.62          | 3.55                                | 50                                          | 2,000                             | 74.6                              | 305(1,000)           |
| Solid    | 22         | 1/0.643               | 0.64          | 0.81                   | 2.26          | 56.40                               | 50                                          | 2,000                             | 13.5                              | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.81                   | 2.43          | 35.20                               | 50                                          | 2,000                             | 17.6                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.81                   | 2.64          | 22.20                               | 50                                          | 2,000                             | 23.2                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.81                   | 2.91          | 14.00                               | 50                                          | 2,000                             | 30.7                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.81                   | 3.25          | 8.78                                | 50                                          | 2,000                             | 41.0                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.81                   | 3.67          | 5.53                                | 50                                          | 2,000                             | 54.8                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.81                   | 4.21          | 3.48                                | 50                                          | 2,000                             | 74.6                              | 305(1,000)           |

- Remarks 1) Size range : UL 26-9AWG, CSA 22-4/0AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 125°C, single-wire in air



## 2-10 Irradiated Wire

Lead Free Heat-resistant irradiated XLPE insulated wire



### UL Style No.3271 CSA Type CL1251

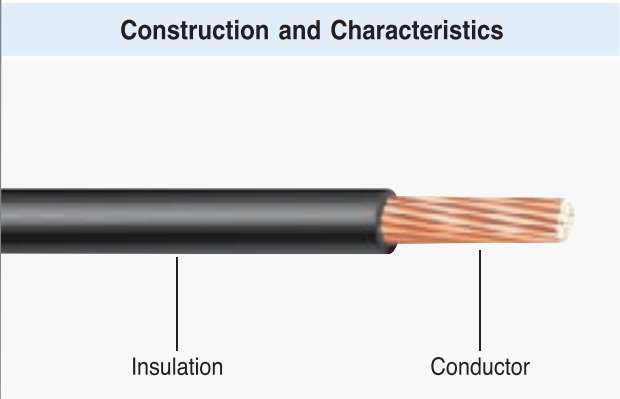
- Rating UL : 600V, 125°C / CSA : 600V, 125°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127/210.2

#### Application

1. Internal wiring of electrical and electronic equipments.
2. Lead wires of motors.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

3271 E52853 VW-1  AWM 125C LL57183 CSA CL1251 XLPE 125C 600V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 22         | 17/0.160              | 0.76          | 0.81                   | 2.38          | 59.40                               | 50                                          | 2,000                             | 13.5                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.81                   | 2.56          | 36.70                               | 50                                          | 2,000                             | 17.6                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.81                   | 2.80          | 23.20                               | 50                                          | 2,000                             | 23.2                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.81                   | 3.11          | 14.60                               | 50                                          | 2,000                             | 30.7                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.81                   | 3.50          | 8.96                                | 50                                          | 2,000                             | 41.0                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.81                   | 3.98          | 5.64                                | 50                                          | 2,000                             | 54.8                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.81                   | 4.62          | 3.55                                | 50                                          | 2,000                             | 74.6                              | 305(1,000)           |
| Solid    | 22         | 1/0.643               | 0.64          | 0.81                   | 2.26          | 56.40                               | 50                                          | 2,000                             | 13.5                              | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.81                   | 2.43          | 35.20                               | 50                                          | 2,000                             | 17.6                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.81                   | 2.64          | 22.20                               | 50                                          | 2,000                             | 23.2                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.81                   | 2.91          | 14.00                               | 50                                          | 2,000                             | 30.7                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.81                   | 3.25          | 8.78                                | 50                                          | 2,000                             | 41.0                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.81                   | 3.67          | 5.53                                | 50                                          | 2,000                             | 54.8                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.81                   | 4.21          | 3.48                                | 50                                          | 2,000                             | 74.6                              | 305(1,000)           |

- Remarks 1) Size range : UL 30-4/0AWG, CSA 22-4/0AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 125°C, single-wire in air



## 2-11 Irradiated Wire

Lead Free Heat-resistant irradiated XLPE insulated wire

### UL Style No.3321 CSA Type AWM

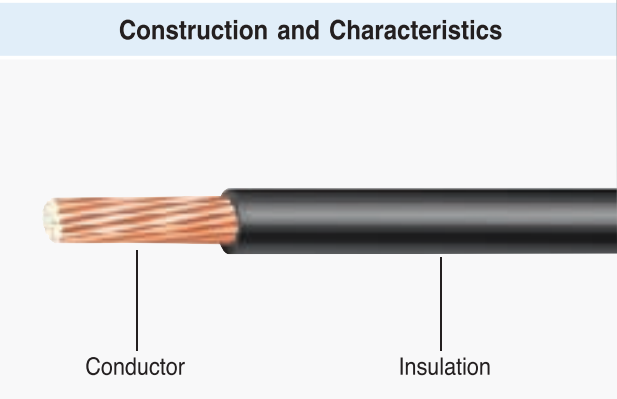
- Rating UL : 600V, 150°C / CSA : 600V, 150°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

1. Internal wiring of electrical and electronic equipments.
2. Lead wires of motors.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

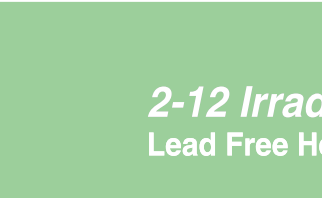


#### Marking

3321 E52853 VW-1  AWM 150C 600V LL57184 CSA AWM I A/B 150C 600V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 22         | 17/0.160              | 0.76          | 0.81                   | 2.38          | 59.40                               | 1,000                                       | 1,500                             | 13.5                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.81                   | 2.56          | 36.70                               | 1,000                                       | 1,500                             | 17.6                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.81                   | 2.80          | 23.20                               | 1,000                                       | 1,500                             | 23.2                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.81                   | 3.11          | 14.60                               | 1,000                                       | 1,500                             | 30.7                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.81                   | 3.50          | 8.96                                | 1,000                                       | 1,500                             | 41.0                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.81                   | 3.98          | 5.64                                | 1,000                                       | 1,500                             | 54.8                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.81                   | 4.62          | 3.55                                | 1,000                                       | 1,500                             | 74.6                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 22         | 1/0.643               | 0.64          | 0.81                   | 2.26          | 56.40                               | 1,000                                       | 1,500                             | 13.5                              | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.81                   | 2.43          | 35.20                               | 1,000                                       | 1,500                             | 17.6                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.81                   | 2.64          | 22.20                               | 1,000                                       | 1,500                             | 23.2                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.81                   | 2.91          | 14.00                               | 1,000                                       | 1,500                             | 30.7                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.81                   | 3.25          | 8.78                                | 1,000                                       | 1,500                             | 41.0                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.81                   | 3.67          | 5.53                                | 1,000                                       | 1,500                             | 54.8                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.81                   | 4.21          | 3.48                                | 1,000                                       | 1,500                             | 74.6                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |

- Remarks 1) Size range : UL 30-4/0AWG, CSA 22-4/0AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 150°C, single-wire in air

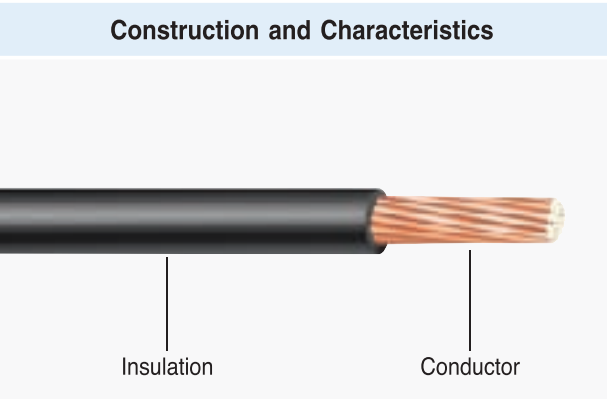


## 2-12 Irradiated Wire

Lead Free Heat-resistant irradiated XLPE insulated wire

### UL Style No.3398 CSA Type CL1252/AWM

Construction and Characteristics



Insulation

Conductor

- Rating UL : 300V, 150°C / CSA : 300V, 150°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

Internal wiring of electrical and electronic equipments.

#### Features

1. Standard : For both UL and CSA
2. Flame retardant : UL VW-1, Material Control Law -F-
3. Thermally stable due to radiation cross-linking, thus insulation does not melt at 350°C (5 sec or less).
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

#### Marking

3398 E52853 VW-1  AWM 150C LL57183 CSA CL1252 XLPE 150C 300V FT1 AWG NO. LS Cable -F- LF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.40                   | 1.18          | 239.00                              | 1,000                                       | 2,000                             | 4.1                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 150.00                              | 1,000                                       | 2,000                             | 5.5                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.40                   | 1.41          | 94.20                               | 1,000                                       | 2,000                             | 7.3                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.40                   | 1.56          | 59.40                               | 1,000                                       | 2,000                             | 9.7                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.46                   | 1.86          | 36.70                               | 1,000                                       | 2,000                             | 12.8                              | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.46                   | 2.10          | 23.20                               | 1,000                                       | 2,000                             | 17.1                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.46                   | 2.41          | 14.60                               | 1,000                                       | 2,000                             | 22.8                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 28         | 1/0.320               | 0.32          | 0.40                   | 1.12          | 227.00                              | 1,000                                       | 2,000                             | 4.1                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.40                   | 1.20          | 143.00                              | 1,000                                       | 2,000                             | 5.5                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.40                   | 1.31          | 89.30                               | 1,000                                       | 2,000                             | 7.3                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.40                   | 1.44          | 56.40                               | 1,000                                       | 2,000                             | 9.7                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.46                   | 1.73          | 35.20                               | 1,000                                       | 2,000                             | 12.8                              | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.46                   | 1.94          | 22.20                               | 1,000                                       | 2,000                             | 17.1                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.46                   | 2.21          | 14.00                               | 1,000                                       | 2,000                             | 22.8                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.40                   | 1.28          | 150.00                              | 1,000                                       | 2,000                             | 5.5                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.40                   | 1.41          | 94.20                               | 1,000                                       | 2,000                             | 7.3                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.40                   | 1.56          | 59.40                               | 1,000                                       | 2,000                             | 9.7                               | 610(2,000)           |

- Remarks 1) Size range : UL 32-10AWG, CSA : CL1252 22-16AWG, AWM 32-10AWG
- 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 150°C, single-wire in air





2-13 Irradiated Wire  
Lead Free Flexible high voltage wire

3, 6kVDC UL Style No.3239

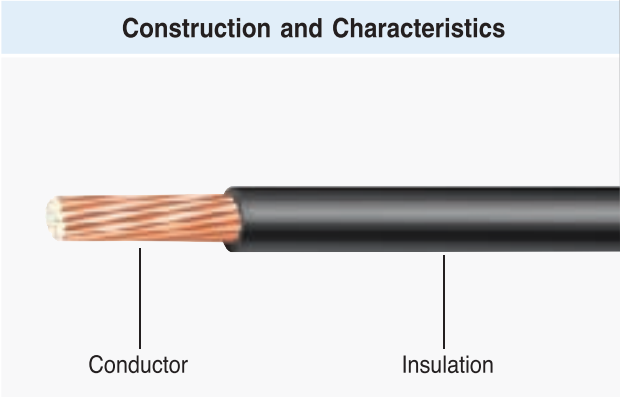
- Rating     UL : 3,6kVDC, 105°C
- Standard   UL : UL Subject 758

Application

Internal wiring of electronic equipment such as LCD back light.

Features

1. Flame retardant : UL VW-1, Material Control Law -F-
2. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

3239 E52853 VW-1  AWM 3, 6KVDC 105C AWG NO. LS Cable -F- ND

| Rating Volt. | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|--------------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|              | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| 3kVDC        | 24         | 19/0.127              | 0.64          | 0.48                   | 1.60          | 89.80                               | 1,000                                       | 7,000                             | 610(2,000)           |
|              | 22         | 19/0.160              | 0.80          | 0.48                   | 1.76          | 58.10                               | 1,000                                       | 7,000                             | 610(2,000)           |
|              | 20         | 1/0.813               | 0.81          | 0.48                   | 1.77          | 35.00                               | 1,000                                       | 7,000                             | 610(2,000)           |
| 6kVDC        | 24         | 19/0.127              | 0.64          | 0.55                   | 1.74          | 89.80                               | 1,000                                       | 7,000                             | 610(2,000)           |
|              | 22         | 19/0.160              | 0.80          | 0.55                   | 1.90          | 58.10                               | 1,000                                       | 7,000                             | 610(2,000)           |
|              | 20         | 1/0.813               | 0.81          | 0.55                   | 1.91          | 35.00                               | 1,000                                       | 7,000                             | 610(2,000)           |



2-14 Irradiated Wire  
Lead Free Flexible high voltage wire

UL Style No. 3633, 3613

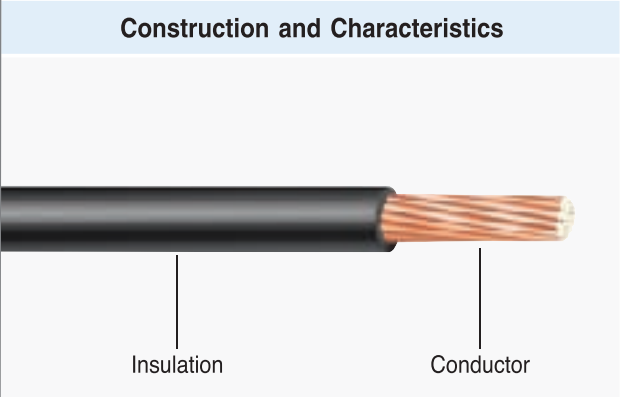
- Rating     UL : 3kVAC, 150°C
- Standard   UL : UL Subject 758

Application

Internal wiring of electronic equipment such as LCD back light.

Features

1. Flame retardant : UL VW-1, Material Control Law -F-
2. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

3633(3613) E52853 VW-1  AWM 3KVAC 150C AWG NO. LS Cable -F- ND

| Style No. | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|-----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|           | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| 3633      | 28         | 19/0.080              | 0.40          | 0.34                   | 1.08          | 223.00                              | 100                                         | 7,000                             | 610(2,000)           |
|           | 28         | 7/0.127               | 0.38          | 0.34                   | 1.06          | 223.00                              | 100                                         | 7,000                             | 610(2,000)           |
|           | 26         | 7/0.160               | 0.48          | 0.34                   | 1.16          | 89.80                               | 100                                         | 7,000                             | 610(2,000)           |
|           | 24         | 19/0.127              | 0.64          | 0.34                   | 1.32          | 58.10                               | 100                                         | 7,000                             | 610(2,000)           |
|           |            |                       |               |                        |               |                                     |                                             |                                   |                      |
| 3613      | 28         | 19/0.080              | 0.40          | 0.50                   | 1.40          | 223.00                              | 100                                         | 7,000                             | 610(2,000)           |
|           | 28         | 7/0.127               | 0.38          | 0.50                   | 1.38          | 223.00                              | 100                                         | 7,000                             | 610(2,000)           |
|           | 26         | 7/0.160               | 0.48          | 0.50                   | 1.48          | 139.00                              | 100                                         | 7,000                             | 610(2,000)           |
|           | 24         | 19/0.127              | 0.64          | 0.50                   | 1.64          | 89.80                               | 100                                         | 7,000                             | 610(2,000)           |
|           | 22         | 19/0.160              | 0.80          | 0.50                   | 1.80          | 58.10                               | 100                                         | 7,000                             | 610(2,000)           |

► Remarks   1) Size range : UL 30-10AWG

### 3-1 Halogen Free Irradiated Wire

Halogen Free Heat-resistant irradiated XLPE insulated wire

#### UL Style No. 10368

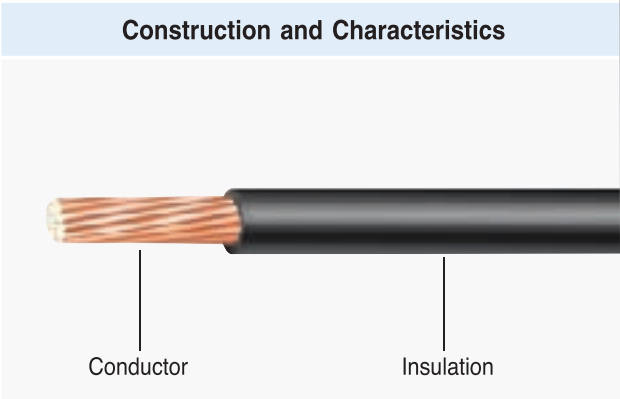
- Rating     UL : 300V, 105°C / CSA : 300V, 105°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.127

#### Application

Internal wiring of electrical and electronic equipments.

#### Features

1. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

10368 E52853  AWM I A/B 105C 300V VW-1 AWG NO. LS Cable -F- HF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.25                   | 0.88          | 239.00                              | 10                                          | 2,000                             | 2.7                               | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.25                   | 0.98          | 150.00                              | 10                                          | 2,000                             | 3.8                               | 1,220(4,000)         |
|          | 24         | 7/0.203               | 0.61          | 0.25                   | 1.11          | 94.20                               | 10                                          | 2,000                             | 5.1                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.25                   | 1.26          | 59.40                               | 10                                          | 2,000                             | 7.1                               | 610(2,000)           |
|          | 20         | 19/0.203              | 1.02          | 0.25                   | 1.52          | 36.70                               | 10                                          | 2,000                             | 9.5                               | 610(2,000)           |

► Remarks 1) Size range : UL 40-10AWG

### 3-2 Halogen Free Irradiated Wire

Halogen Free Heat-resistant irradiated XLPE insulated wire

#### UL Style No. 3275

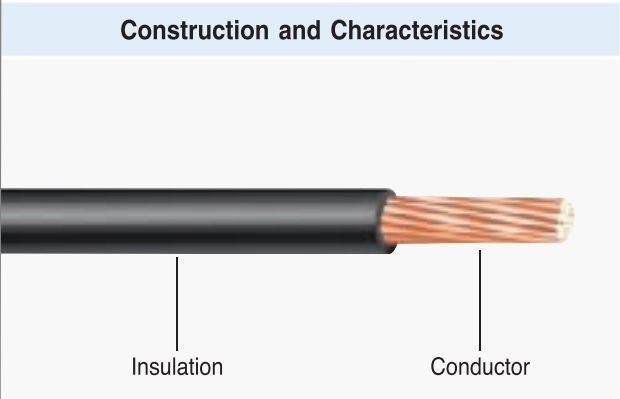
- Rating     UL : 1,000V, 105°C / CSA : 1,000V, 105°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.127

#### Application

Internal wiring of electrical and electronic equipments.

#### Features

1. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

3275 E52853  AWM I A/B 105C 1000V VW-1 AWG NO. LS Cable -F- HF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 24         | 11/0.160              | 0.61          | 0.80                   | 2.21          | 94.20                               | 15                                          | 3,000                             | 6.6                               | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.80                   | 2.36          | 59.40                               | 15                                          | 3,000                             | 8.7                               | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.80                   | 2.54          | 36.70                               | 15                                          | 3,000                             | 11.4                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.80                   | 2.78          | 23.20                               | 15                                          | 3,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.80                   | 3.09          | 14.60                               | 15                                          | 3,000                             | 19.9                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.80                   | 3.48          | 8.96                                | 15                                          | 3,000                             | 26.5                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.80                   | 3.96          | 5.64                                | 15                                          | 3,000                             | 35.4                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.80                   | 4.60          | 3.55                                | 15                                          | 3,000                             | 48.2                              | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.80                   | 2.11          | 89.30                               | 15                                          | 3,000                             | 6.6                               | 305(1,000)           |
| Solid    | 22         | 1/0.643               | 0.64          | 0.80                   | 2.24          | 56.40                               | 15                                          | 3,000                             | 8.7                               | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.80                   | 2.41          | 35.20                               | 15                                          | 3,000                             | 11.4                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.80                   | 2.62          | 22.20                               | 15                                          | 3,000                             | 15.0                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.80                   | 2.89          | 14.00                               | 15                                          | 3,000                             | 19.9                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.80                   | 3.23          | 8.78                                | 15                                          | 3,000                             | 26.5                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.80                   | 3.65          | 5.53                                | 15                                          | 3,000                             | 35.4                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.80                   | 4.19          | 3.48                                | 15                                          | 3,000                             | 48.2                              | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.80                   | 2.36          | 59.40                               | 15                                          | 3,000                             | 8.7                               | 305(1,000)           |
| TA-SC    | 20         | 7/0.320               | 0.96          | 0.80                   | 2.56          | 36.70                               | 15                                          | 3,000                             | 11.4                              | 305(1,000)           |

► Remarks 1) Size range : UL 26-9AWG

### 3-3 Halogen Free Irradiated Wire

Halogen Free Heat-resistant irradiated XLPE insulated wire

#### UL Style No. 3302

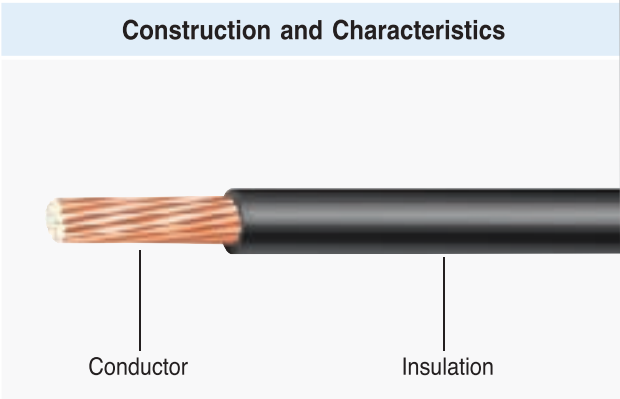
- Rating     UL : 30V, 105°C
- Standard   UL : UL Subject 758

##### Application

Internal wiring of electrical and electronic equipments.

##### Features

1. Flame retardant : UL VW-1,   Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



##### Marking

3302 E52853  AWM 105C 30V VW-1 AWG NO.   LS Cable   -F-   HF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.25                   | 0.88          | 239.00                              | 10                                          | 500                               | 2.7                               | 1,220(4,000)         |
|          | 26         | 7/0.160               | 0.48          | 0.25                   | 0.98          | 150.00                              | 10                                          | 500                               | 3.8                               | 1,220(4,000)         |
|          | 24         | 7/0.203               | 0.61          | 0.25                   | 1.11          | 94.20                               | 10                                          | 500                               | 5.1                               | 610(2,000)           |

► Remarks   1) Size range : Min. 40AWG

### 3-4 Halogen Free Irradiated Wire

Halogen Free Heat-resistant irradiated XLPE insulated wire

#### UL Style No. 3385

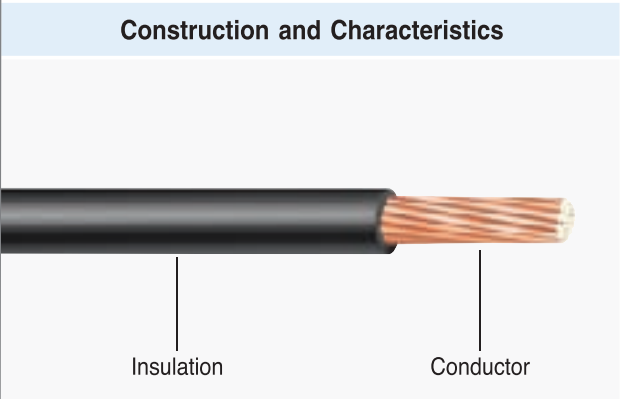
- Rating     UL : 300V, 105°C / CSA : 300V, 105°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.127

##### Application

Internal wiring of electrical and electronic equipments.

##### Features

1. Flame retardant : UL VW-1,   CSA FT1,   Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



##### Marking

3385 E52853  AWM I A/B 105C 300V VW-1 AWG NO.   LS Cable   -F-   HF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.42                   | 1.15          | 381.00                              | 10                                          | 2,000                             | 2.3                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.42                   | 1.22          | 239.00                              | 10                                          | 2,000                             | 3.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.42                   | 1.32          | 150.00                              | 10                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.42                   | 1.45          | 94.20                               | 10                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.42                   | 1.60          | 59.40                               | 10                                          | 2,000                             | 7.2                               | 610(2,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.42                   | 1.78          | 36.70                               | 10                                          | 2,000                             | 9.4                               | 610(2,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.42                   | 2.02          | 23.20                               | 10                                          | 2,000                             | 12.5                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.42                   | 2.33          | 14.60                               | 10                                          | 2,000                             | 15.9                              | 305(1,000)           |
| Solid    | 30         | 1/0.254               | 0.26          | 0.42                   | 1.10          | 361.00                              | 10                                          | 2,000                             | 2.3                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.42                   | 1.16          | 227.00                              | 10                                          | 2,000                             | 3.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.42                   | 1.24          | 143.00                              | 10                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.42                   | 1.35          | 89.30                               | 10                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.42                   | 1.48          | 56.40                               | 10                                          | 2,000                             | 7.2                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.42                   | 1.65          | 35.20                               | 10                                          | 2,000                             | 9.4                               | 610(2,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.42                   | 1.86          | 22.20                               | 10                                          | 2,000                             | 12.5                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.42                   | 2.13          | 14.00                               | 10                                          | 2,000                             | 15.9                              | 305(1,000)           |
| TA-SC    | 26         | 7/0.160               | 0.48          | 0.42                   | 1.32          | 150.00                              | 10                                          | 2,000                             | 4.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.42                   | 1.45          | 94.20                               | 10                                          | 2,000                             | 5.3                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.42                   | 1.60          | 59.40                               | 10                                          | 2,000                             | 7.2                               | 610(2,000)           |

► Remarks   1) Size range : UL 32-10AWG



### 3-5 Halogen Free Irradiated Wire

Halogen Free Heat-resistant irradiated XLPE insulated wire

### 3-6 Halogen Free Irradiated Wire

Halogen Free Heat-resistant irradiated XLPE insulated wire

UL Style No. 3386

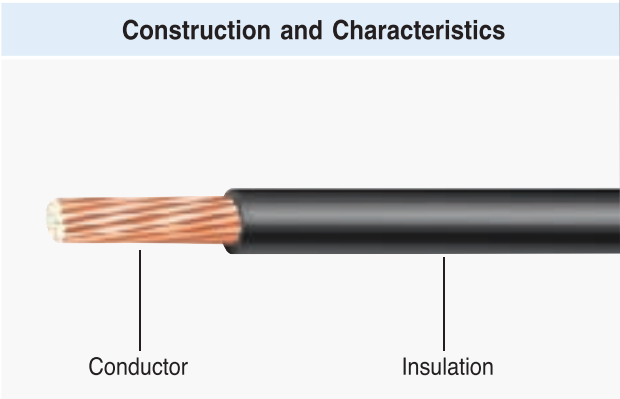
- Rating     UL : 600V, 105°C / 600V, 105°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.127

Application

Internal wiring of electrical and electronic equipments.

Features

1. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



UL Style No. 3619

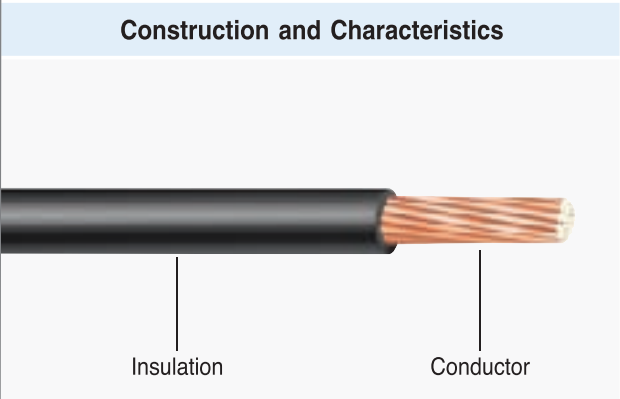
- Rating     UL : 150V, 105°C / CSA : 150V, 105°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.127

Application

Internal wiring of electrical and electronic equipments.

Features

1. Flame retardant : UL VW-1, CSA FT1, Material Control Law -F-
2. Small diameter saves space.
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



Marking

3386 E52853  AWM I A/B 105C 600V VW-1 AWG NO. LS Cable -F- HF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.80                   | 2.08          | 150.00                              | 15                                          | 2,000                             | 5.8                               | 305(1,000)           |
|          | 24         | 11/0.160              | 0.61          | 0.80                   | 2.21          | 94.20                               | 15                                          | 2,000                             | 7.6                               | 305(1,000)           |
|          | 22         | 17/0.160              | 0.76          | 0.80                   | 2.36          | 59.40                               | 15                                          | 2,000                             | 10.0                              | 305(1,000)           |
|          | 20         | 26/0.160              | 0.94          | 0.80                   | 2.54          | 36.70                               | 15                                          | 2,000                             | 13.1                              | 305(1,000)           |
|          | 18         | 41/0.160              | 1.18          | 0.80                   | 2.78          | 23.20                               | 15                                          | 2,000                             | 17.2                              | 305(1,000)           |
|          | 16         | 26/0.254              | 1.49          | 0.80                   | 3.09          | 14.60                               | 15                                          | 2,000                             | 22.8                              | 305(1,000)           |
|          | 14         | 41/0.254              | 1.88          | 0.80                   | 3.48          | 8.96                                | 15                                          | 2,000                             | 30.4                              | 305(1,000)           |
|          | 12         | 65/0.254              | 2.36          | 0.80                   | 3.96          | 5.64                                | 15                                          | 2,000                             | 40.6                              | 305(1,000)           |
|          | 10         | 66/0.320              | 3.00          | 0.80                   | 4.60          | 3.55                                | 15                                          | 2,000                             | 55.3                              | 305(1,000)           |
| Solid    | 26         | 1/0.404               | 0.40          | 0.80                   | 2.00          | 143.00                              | 15                                          | 2,000                             | 5.8                               | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.80                   | 2.11          | 89.30                               | 15                                          | 2,000                             | 7.6                               | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.80                   | 2.24          | 56.40                               | 15                                          | 2,000                             | 10.0                              | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.80                   | 2.41          | 35.20                               | 15                                          | 2,000                             | 13.1                              | 305(1,000)           |
|          | 18         | 1/1.024               | 1.02          | 0.80                   | 2.62          | 22.20                               | 15                                          | 2,000                             | 17.2                              | 305(1,000)           |
|          | 16         | 1/1.290               | 1.29          | 0.80                   | 2.89          | 14.00                               | 15                                          | 2,000                             | 22.8                              | 305(1,000)           |
|          | 14         | 1/1.630               | 1.63          | 0.80                   | 3.23          | 8.78                                | 15                                          | 2,000                             | 30.4                              | 305(1,000)           |
|          | 12         | 1/2.050               | 2.05          | 0.80                   | 3.65          | 5.53                                | 15                                          | 2,000                             | 40.6                              | 305(1,000)           |
|          | 10         | 1/2.590               | 2.59          | 0.80                   | 4.19          | 3.48                                | 15                                          | 2,000                             | 55.3                              | 305(1,000)           |
| TA-SC    | 24         | 7/0.203               | 0.61          | 0.80                   | 2.21          | 94.20                               | 15                                          | 2,000                             | 7.6                               | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.80                   | 2.36          | 59.40                               | 15                                          | 2,000                             | 10.0                              | 305(1,000)           |

► Remarks 1) Size range : UL 32-4/0AWG

Marking

3619 E52853  AWM 105C 150V VW-1 AWG NO. LS Cable -F- HF

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.20                   | 0.88          | 150.00                              | 10                                          | 1,500                             | 1,220(4,000)         |



4-1 High Voltage TV Wire

Lead Free High voltage wire  
for internal wiring of TV

UL Style No.3239 CSA TV-10~50

- Rating UL : 10~50kVDC, 105°C / CSA : 10~50kVDC, 105°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

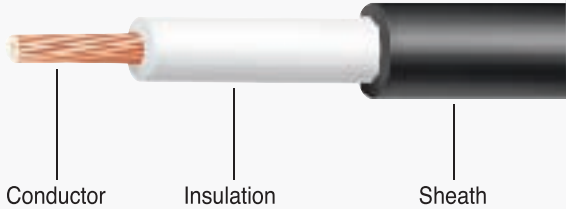
Application

Internal wiring of high voltage electrical and electronic equipments such as TV, microwave ovens and FBT. etc.

Features

1. Flame retardant : UL VW-1
2. Excellent electrical characteristics such as dielectric strength.
3. Excellent flexibility.
4. Excellent stripping and adhesion between insulation and conductor.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

Construction and Characteristics



Marking

3239 E52853 VW-1  AWM 20KVDC 105C LL33908 CSA TV-20 XLHDPE 105C FT1 AWG NO. LS Cable -F- LF

| CSA Type | Rating     |              | Conductor  |                       |               | Insulation             |               | Sheath                 |               |                | Max. Cond. Resistance (20°C) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|--------------|------------|-----------------------|---------------|------------------------|---------------|------------------------|---------------|----------------|------------------------------|-----------------------------------|----------------------|
|          | Temp. (°C) | Volt. (kVDC) | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) | Color          |                              |                                   |                      |
| TV-10    | 105        | 10           | 22         | 7/0.254               | 0.762         | 0.32                   | 1.40          | 0.40                   | 2.20          | WH<br>RD<br>BK | 54.70                        | 15                                | 305(1,000)           |
| TV-20    | 105        | 20           | 22         | 7/0.254               | 0.762         | 0.68                   | 2.12          | 0.54                   | 3.20          |                | 54.70                        | 30                                | 305(1,000)           |
| TV-20    | 105        | 20           | 18         | 19/0.254              | 1.270         | 0.68                   | 2.63          | 0.57                   | 3.77          |                | 20.30                        | 30                                | 305(1,000)           |
| TV-30    | 105        | 30           | 22         | 7/0.254               | 0.762         | 0.68                   | 2.12          | 0.66                   | 3.44          |                | 54.70                        | 45                                | 305(1,000)           |
| TV-40    | 105        | 40           | 22         | 7/0.254               | 0.762         | 1.02                   | 2.80          | 0.70                   | 4.20          |                | 54.70                        | 60                                | 305(1,000)           |
| TV-50    | 105        | 50           | 22         | 7/0.254               | 0.762         | 1.20                   | 3.16          | 1.02                   | 5.20          | WH<br>RD<br>BK | 54.70                        | 75                                | 305(1,000)           |
| TV-20    | 105        | 20           | 20         | 1/0.813               | 0.813         | 0.67                   | 2.15          | 0.54                   | 3.23          |                | 35.00                        | 30                                | 305(1,000)           |
| TV-20    | 105        | 20           | 20         | 1/0.813               | 0.813         | 0.62                   | 2.05          | 0.52                   | 3.09          |                | 35.00                        | 30                                | 305(1,000)           |
| TV-30    | 105        | 30           | 20         | 1/0.813               | 0.813         | 0.67                   | 2.15          | 0.67                   | 3.49          |                | 35.00                        | 45                                | 305(1,000)           |
| TV-40    | 105        | 40           | 20         | 1/0.813               | 0.813         | 1.00                   | 2.81          | 0.70                   | 4.21          |                | 35.00                        | 60                                | 305(1,000)           |
| TV-50    | 105        | 50           | 20         | 1/0.813               | 0.813         | 1.11                   | 3.03          | 1.09                   | 5.21          |                | 35.00                        | 75                                | 305(1,000)           |

- Remarks
- 1) Conductor : Tin coated soft annealed copper wire
  - 2) Insulation : XLPE
  - 3) Sheath : XLPVC
  - 4) Insulation resistance : more than 1,000MΩ·km



4-2 High Voltage TV Wire

Lead Free High voltage wire  
for internal wiring of TV (Single insulation type)

UL Style No.3476 CSA TV-6

- Rating UL : 3kVDC, 105°C / CSA : 6kVDC, 80°C
- Standard UL : UL Subject 758 / CSA : CSA C22.2 NO.127

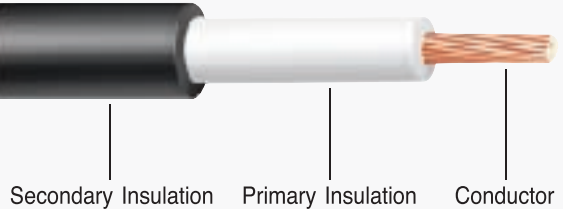
Application

Internal wiring of high voltage electrical and electronic equipments such as TV, microwave ovens and FBT. etc.

Features

1. Flame retardant : UL VW-1
2. Excellent electrical characteristics such as dielectric strength.
3. Excellent handling of connection.
4. Excellent stripping and adhesion between insulation and conductor.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

Construction and Characteristics



Marking

3476 E52853 VW-1  AWM 3KVDC 105C LL33908 CSA TV-6 XLPVC FT1 80C AWG NO. LS Cable -F- LF

| Size (AWG) | Conductor             |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|            | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| 22         | 7/0.254               | 0.76          | 0.85                   | 2.46          | 54.70                               | 15.00                                       | 6.00                              | 59.40                             | 305(1,000)           |
| 22         | 1/0.643               | 0.64          | 0.85                   | 2.34          | 56.30                               | 15.00                                       | 6.00                              | 56.40                             | 305(1,000)           |
| 20         | 1/0.813               | 0.81          | 0.85                   | 2.51          | 35.00                               | 15.00                                       | 6.00                              | 35.20                             | 305(1,000)           |

- Remarks
- 1) Conductor : Tin coated soft annealed copper wire
  - 2) Insulation : XLPVC
  - 3) Insulation resistance : more than 15MΩ·km

## 5-1 Teflon Wire

Teflon (PVdF) insulated wire

### UL Style No.1422

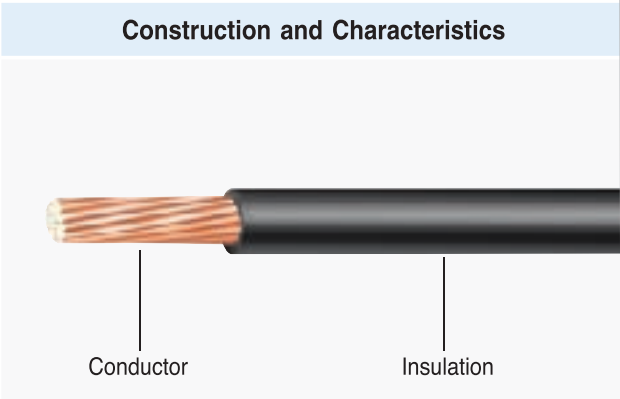
- Rating     UL : 105°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of small electrical and electronic equipments.
2. Internal wiring of computer and business equipments.

#### Features

1. Flame retardant : UL VW-1
2. Small diameter saves space.
3. Excellent mechanical strength such as abrasion and cut-through resistance.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs.



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.14                   | 0.59          | 354.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.14                   | 0.66          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.14                   | 0.76          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.14                   | 0.89          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.14                   | 1.04          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.14                   | 1.24          | 34.40                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
|          | 18         | 7/0.404               | 1.27          | 0.14                   | 1.54          | 22.30                               | 30.00                                       | 500                               | 15.0                              | 610(2,000)           |
| Solid    | 30         | 1/0.254               | 0.25          | 0.14                   | 0.53          | 373.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.14                   | 0.60          | 232.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.14                   | 0.68          | 145.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.14                   | 0.79          | 89.10                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.14                   | 0.92          | 56.30                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.14                   | 1.09          | 35.00                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.14                   | 0.66          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.14                   | 0.76          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.14                   | 0.89          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.14                   | 1.04          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air  
              2) Conductor : Tin coated soft annealed copper wire, TA-SC

## 5-2 Teflon Wire

Teflon (PVdF) insulated wire

### UL Style No.1426

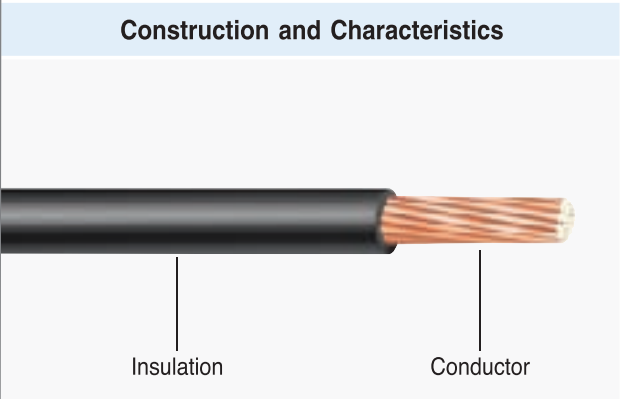
- Rating     UL : 105°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of small electrical and electronic equipments.
2. Internal wiring of computer and business equipments.

#### Features

1. Flame retardant : UL VW-1
2. Small diameter saves space.
3. Excellent mechanical strength such as abrasion and cut-through resistance.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.17                   | 0.65          | 354.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.17                   | 0.72          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.17                   | 0.82          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.17                   | 0.95          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.17                   | 1.10          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.17                   | 1.30          | 34.40                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
|          | 18         | 7/0.404               | 1.27          | 0.17                   | 1.60          | 22.30                               | 30.00                                       | 500                               | 15.0                              | 610(2,000)           |
| Solid    | 30         | 1/0.254               | 0.25          | 0.17                   | 0.59          | 373.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.17                   | 0.66          | 232.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.17                   | 0.74          | 145.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.17                   | 0.85          | 89.10                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.17                   | 0.98          | 56.30                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.17                   | 1.15          | 35.00                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.17                   | 0.72          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.17                   | 0.82          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.17                   | 0.95          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.17                   | 1.10          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air  
              2) Conductor : Tin coated soft annealed copper wire, TA-SC



## 5-3 Teflon Wire

Teflon (ETFE) insulated wire

### UL Style No.1508

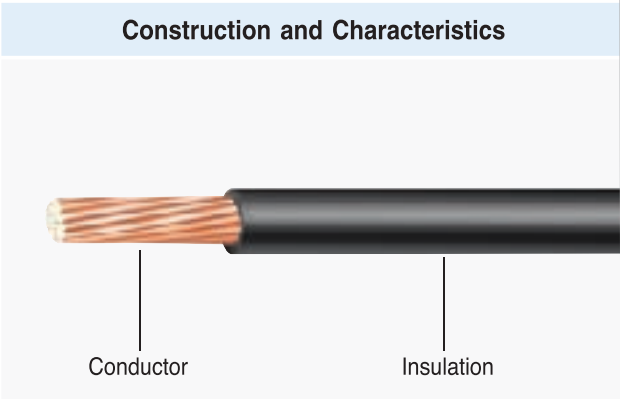
- Rating      UL : 30V, 105°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of small electrical and electronic equipments.
2. Internal wiring of computer and business and audio/video equipments.

#### Features

1. Flame retardant : UL VW-1
2. Small diameter saves space.
3. Excellent electric characteristics and mechanical strength.
4. Excellent low temperature characteristics.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.15                   | 0.61          | 354.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.15                   | 0.68          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.15                   | 0.78          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.15                   | 0.91          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.15                   | 1.06          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.15                   | 1.26          | 34.40                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
|          | 18         | 7/0.404               | 1.27          | 0.15                   | 1.57          | 22.30                               | 30.00                                       | 500                               | 15.0                              | 610(2,000)           |
| Solid    | 30         | 1/0.254               | 0.25          | 0.15                   | 0.55          | 373.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.15                   | 0.62          | 232.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.15                   | 0.70          | 145.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.15                   | 0.81          | 89.10                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.15                   | 0.94          | 56.30                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.15                   | 1.11          | 35.00                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.15                   | 0.68          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.15                   | 0.78          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.15                   | 0.91          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.15                   | 1.06          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.15                   | 1.26          | 34.40                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |

- Remarks 1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air
- 2) Conductor : Tin coated soft annealed copper wire, TA-SC
- 3) UL1609 is included among UL1508.
- Construction and performance of UL1670 are the same as UL1508, but rating(voltage, temperature) is different.
- UL1609 : 125V/105°C, UL1670 : 150°C, voltage is not specified.

## 5-4 Teflon Wire

Teflon (ETFE) insulated wire

### UL Style No.1516

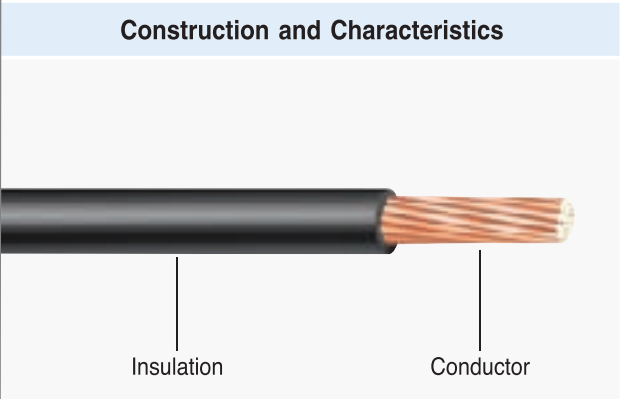
- Rating      UL : 105°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of small electrical and electronic equipments.
2. Internal wiring of computer, business and audio/video equipments.

#### Features

1. Flame retardant : UL VW-1
2. Small diameter saves space.
3. Excellent electric characteristics and mechanical strength.
4. Excellent low temperature characteristics.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.12                   | 0.55          | 354.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.12                   | 0.62          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.12                   | 0.72          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.12                   | 0.85          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.12                   | 1.00          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.12                   | 1.20          | 34.40                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
|          | 18         | 7/0.404               | 1.27          | 0.12                   | 1.57          | 22.30                               | 30.00                                       | 500                               | 15.0                              | 610(2,000)           |
| Solid    | 30         | 1/0.254               | 0.25          | 0.12                   | 0.49          | 373.00                              | 30.00                                       | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.12                   | 0.56          | 232.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.12                   | 0.64          | 145.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.12                   | 0.75          | 89.10                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.12                   | 0.88          | 56.30                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.12                   | 1.11          | 35.00                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.12                   | 0.62          | 223.00                              | 30.00                                       | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.12                   | 0.72          | 139.00                              | 30.00                                       | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.12                   | 0.85          | 85.90                               | 30.00                                       | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.12                   | 1.00          | 54.70                               | 30.00                                       | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.12                   | 1.20          | 34.40                               | 30.00                                       | 500                               | 9.0                               | 610(2,000)           |

- Remarks 1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air
- 2) Conductor : Tin coated soft annealed copper wire, TA-SC



## 5-5 Teflon Wire

Teflon (ETFE) insulated wire

### UL Style No.1517

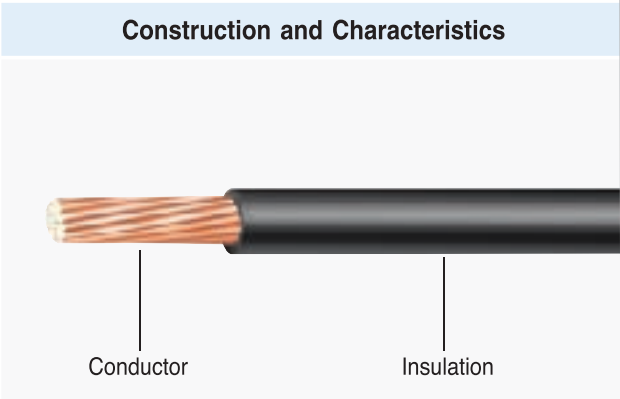
- Rating     UL : 105°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of small electrical and electronic equipments.
2. Internal wiring of computer, business and audio/video equipments.

#### Features

1. Flame retardant : UL VW-1
2. Small diameter saves space.
3. Excellent electric characteristics and mechanical strength.
4. Excellent low temperature characteristics.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.17                   | 0.65          | 354.00                              | 30                                          | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.17                   | 0.72          | 223.00                              | 30                                          | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.17                   | 0.82          | 139.00                              | 30                                          | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.17                   | 0.95          | 85.90                               | 30                                          | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.17                   | 1.10          | 54.70                               | 30                                          | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.17                   | 1.30          | 34.40                               | 30                                          | 500                               | 9.0                               | 610(2,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 30         | 1/0.254               | 0.25          | 0.17                   | 0.59          | 373.00                              | 30                                          | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.17                   | 0.66          | 232.00                              | 30                                          | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.17                   | 0.74          | 145.00                              | 30                                          | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.17                   | 0.85          | 89.10                               | 30                                          | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.17                   | 0.98          | 56.30                               | 30                                          | 500                               | 6.0                               | 610(2,000)           |
| TA-SC    | 28         | 7/0.127               | 0.38          | 0.17                   | 0.72          | 223.00                              | 30                                          | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.17                   | 0.82          | 139.00                              | 30                                          | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.17                   | 0.95          | 85.90                               | 30                                          | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.17                   | 1.10          | 54.70                               | 30                                          | 500                               | 6.0                               | 610(2,000)           |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air
- 2) Conductor : Tin coated soft annealed copper wire, TA-SC

## 5-6 Teflon Wire

Teflon (ETFE) insulated wire



### UL Style No.1610

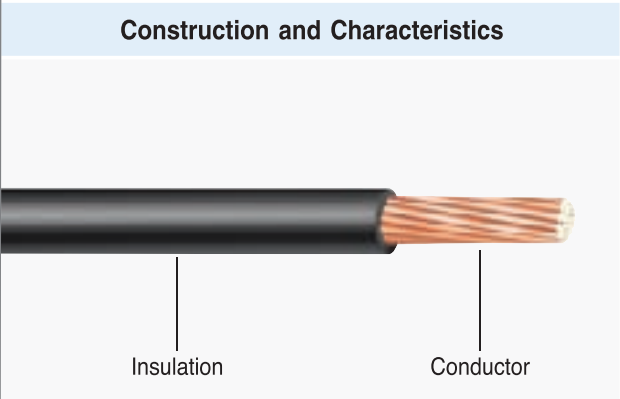
- Rating     UL : 105°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of small electrical and electronic equipments.
2. Internal wiring of computer, business and audio/video equipments.

#### Features

1. Flame retardant : UL VW-1
2. Small diameter saves space.
3. Excellent electric characteristics and mechanical strength.
4. Excellent low temperature characteristics.
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.28                   | 0.87          | 354.00                              | 30                                          | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.28                   | 0.94          | 223.00                              | 30                                          | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.28                   | 1.04          | 139.00                              | 30                                          | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.28                   | 1.17          | 85.90                               | 30                                          | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.28                   | 1.32          | 54.70                               | 30                                          | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.28                   | 1.52          | 34.40                               | 30                                          | 500                               | 9.0                               | 610(2,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 30         | 1/0.254               | 0.25          | 0.28                   | 0.81          | 373.00                              | 30                                          | 500                               | 1.5                               | 610(2,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.28                   | 0.88          | 232.00                              | 30                                          | 500                               | 2.0                               | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.28                   | 0.96          | 145.00                              | 30                                          | 500                               | 3.0                               | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.28                   | 1.07          | 89.10                               | 30                                          | 500                               | 4.0                               | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.28                   | 1.20          | 56.30                               | 30                                          | 500                               | 6.0                               | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.28                   | 1.37          | 35.00                               | 30                                          | 500                               | 9.0                               | 610(2,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 105°C, single-wire in air
- 2) Conductor : Tin coated soft annealed copper wire

## 5-7 Teflon Wire

Teflon (ETFE) insulated wire

### UL Style No.10086

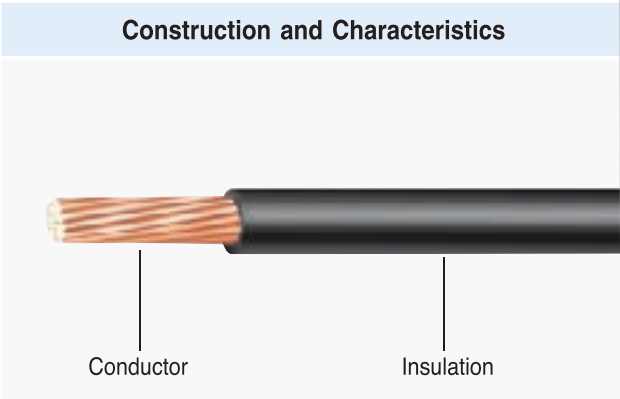
- Rating     UL : 600V, 200°C
- Standard   UL : UL Subject 758

#### Application

Internal wiring of electrical and electronic equipments requiring heat and chemical resistance.

#### Features

1. Flame retardant : UL VW-1
2. Can be replaced by Silicon glass fiber braided wire (SF-2).
3. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

10086 E52853 VW-1  AWM 200C AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance<br>(20°C)<br>( $\Omega$ /km) | Min. Insulation Resistance<br>(15.6°C)<br>(M $\Omega$ ·km) | Dielectric Strength<br>(AC)<br>(V/1min) | Unit Length<br>(m)<br>(ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|----------------------------------------------------|------------------------------------------------------------|-----------------------------------------|----------------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                                    |                                                            |                                         |                            |
| Stranded | 24         | 7/0.203               | 0.61          | 0.28                   | 1.17          | 85.90                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 22         | 7/0.254               | 0.76          | 0.28                   | 1.32          | 54.70                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 20         | 7/0.320               | 0.96          | 0.28                   | 1.52          | 34.40                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 18         | 7/0.404               | 1.21          | 0.28                   | 1.84          | 20.30                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 16         | 19/0.287              | 1.44          | 0.28                   | 2.00          | 15.80                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 14         | 19/0.361              | 1.82          | 0.28                   | 2.38          | 10.00                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
| Solid    | 24         | 1/0.511               | 0.51          | 0.28                   | 1.07          | 89.10                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 22         | 1/0.643               | 0.64          | 0.28                   | 1.20          | 56.30                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 20         | 1/0.813               | 0.81          | 0.28                   | 1.37          | 35.00                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |

- Remarks
- 1) Size range : UL 36-4/0AWG
  - 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 200°C, single-wire in air
  - 3) TA : Tin coated soft annealed copper wire  
GA : Silver coated soft annealed copper wire  
NA : Nickel coated soft annealed copper wire
  - 4) TA : It can be used when diameter of strand is 0.381mm or larger

## 5-8 Teflon Wire

Teflon (ETFE) insulated wire

### UL Style No.10109

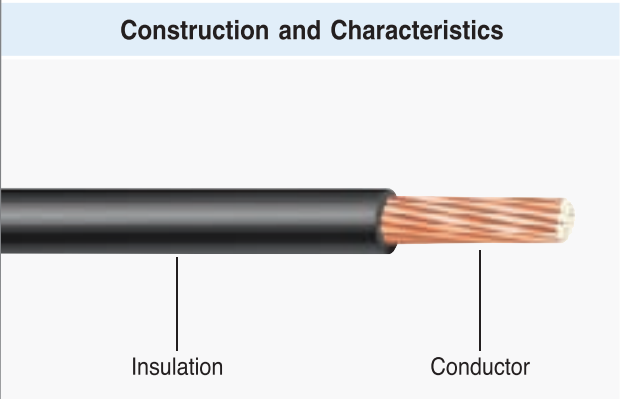
- Rating     UL : 300V, 200°C
- Standard   UL : UL Subject 758

#### Application

Internal wiring of electrical and electronic equipments requiring heat and chemica resistance.

#### Features

1. Flame retardant : UL VW-1
2. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

10109 E52853 VW-1  AWM 200C AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance<br>(20°C)<br>( $\Omega$ /km) | Min. Insulation Resistance<br>(15.6°C)<br>(M $\Omega$ ·km) | Dielectric Strength<br>(AC)<br>(V/1min) | Unit Length<br>(m)<br>(ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|----------------------------------------------------|------------------------------------------------------------|-----------------------------------------|----------------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                                    |                                                            |                                         |                            |
| Stranded | 24         | 7/0.203               | 0.61          | 0.17                   | 0.95          | 85.90                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 22         | 7/0.254               | 0.76          | 0.17                   | 1.10          | 54.70                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 20         | 7/0.320               | 0.96          | 0.17                   | 1.30          | 34.40                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 18         | 7/0.404               | 1.21          | 0.17                   | 1.62          | 20.30                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 16         | 19/0.287              | 1.44          | 0.22                   | 1.88          | 15.80                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 14         | 19/0.361              | 1.82          | 0.22                   | 2.26          | 10.00                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
| Solid    | 24         | 1/0.511               | 0.51          | 0.17                   | 0.85          | 89.10                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 22         | 1/0.643               | 0.64          | 0.17                   | 0.98          | 56.30                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |
|          | 20         | 1/0.813               | 0.81          | 0.17                   | 1.15          | 35.00                                              | 1,000                                                      | 2,000                                   | 305(1,000)                 |

- Remarks
- 1) Size range : UL 36-4/0AWG
  - 2) Allowable current : Ambient temperature 40°C, Max. allowable temperature 200°C, single-wire in air
  - 3) TA : Tin coated soft annealed copper wire  
GA : Silver coated soft annealed copper wire  
NA : Nickel coated soft annealed copper wire
  - 4) TA : It can be used when diameter of strand is 0.381mm or larger





## 5-9 Teflon Wire

Teflon (FEP) insulated wire

### UL Style No.1330

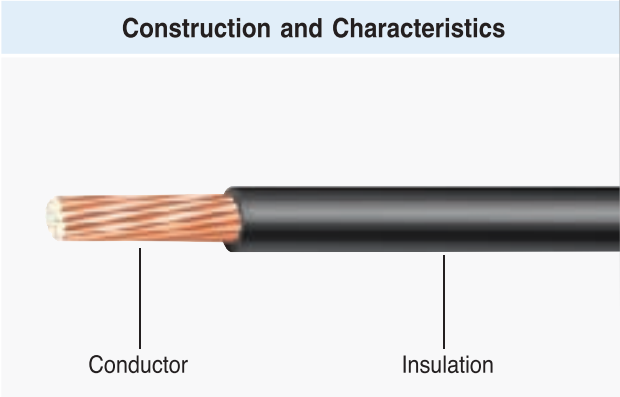
- Rating      UL : 600V, 200°C
- Standard   UL : UL Subject 758

#### Application

1. Internal wiring of electrical and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1330 E52853 VW-1  AWM 200C AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.54                   | 1.56          | 139.00                              | 1,000                                       | 2,000                             | 7.20                              | 305(1,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.54                   | 1.69          | 85.90                               | 1,000                                       | 2,000                             | 9.50                              | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.54                   | 1.84          | 54.70                               | 1,000                                       | 2,000                             | 12.50                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.54                   | 2.04          | 34.40                               | 1,000                                       | 2,000                             | 16.60                             | 305(1,000)           |
|          | 18         | 19/0.254              | 1.28          | 0.54                   | 2.36          | 20.30                               | 1,000                                       | 2,000                             | 23.40                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.54                   | 2.52          | 15.80                               | 1,000                                       | 2,000                             | 28.50                             | 305(1,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.54                   | 2.90          | 10.00                               | 1,000                                       | 2,000                             | 38.30                             | 305(1,000)           |
| Solid    | 26         | 1/0.404               | 0.40          | 0.54                   | 1.48          | 145.00                              | 1,000                                       | 2,000                             | 7.20                              | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.54                   | 1.59          | 89.10                               | 1,000                                       | 2,000                             | 9.50                              | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.54                   | 1.72          | 56.30                               | 1,000                                       | 2,000                             | 12.50                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.54                   | 1.89          | 35.00                               | 1,000                                       | 2,000                             | 16.60                             | 305(1,000)           |
|          | 1.4MM      | 1/1.4                 | 1.40          | 0.57                   | 2.54          | 12.10                               | 1,000                                       | 2,000                             | 28.50                             | 305(1,000)           |
|          | 1.2MM      | 1/1.2                 | 1.20          | 0.57                   | 2.34          | 15.90                               | 1,000                                       | 2,000                             | 23.40                             | 305(1,000)           |
|          | 1.0MM      | 1/1.0                 | 1.00          | 0.57                   | 2.14          | 23.80                               | 1,000                                       | 2,000                             | 16.60                             | 305(1,000)           |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 200°C, single-wire in air
- 2) TA : Tin coated soft annealed copper wire  
                      GA : Silver coated soft annealed copper wire  
                      NA : Nickel coated soft annealed copper wire
- 3) TA : It can be used when diameter of strand is 0.381mm or larger



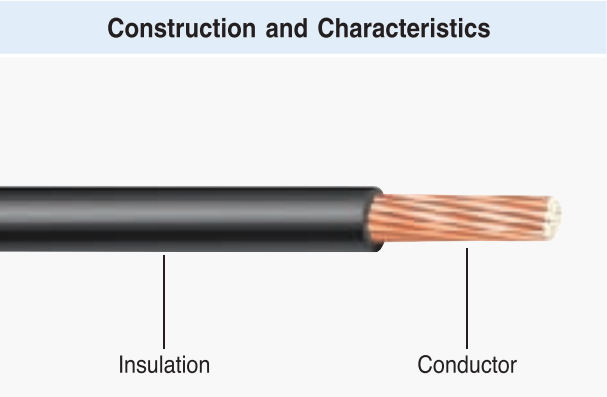
## 5-10 Teflon Wire

Teflon (FEP) insulated wire



### UL Style No.1331

- Construction and Characteristics



Insulation                      Conductor
- Rating      UL : 600V, 150°C
  - Standard   UL : UL Subject 758

#### Application

1. Internal wiring of electrical and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs

#### Marking

1331 E52853 VW-1  AWM 150C AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.54                   | 1.56          | 139.00                              | 1,000                                       | 2,000                             | 6.30                              | 305(1,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.54                   | 1.69          | 85.90                               | 1,000                                       | 2,000                             | 8.40                              | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.54                   | 1.84          | 54.70                               | 1,000                                       | 2,000                             | 11.00                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.54                   | 2.04          | 34.40                               | 1,000                                       | 2,000                             | 14.60                             | 305(1,000)           |
|          | 18         | 19/0.254              | 1.28          | 0.54                   | 2.36          | 20.30                               | 1,000                                       | 2,000                             | 20.60                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.54                   | 2.52          | 15.80                               | 1,000                                       | 2,000                             | 25.80                             | 305(1,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.54                   | 2.90          | 10.00                               | 1,000                                       | 2,000                             | 33.80                             | 305(1,000)           |
| Solid    | 26         | 1/0.404               | 0.40          | 0.54                   | 1.48          | 145.00                              | 1,000                                       | 2,000                             | 6.30                              | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.54                   | 1.59          | 89.10                               | 1,000                                       | 2,000                             | 8.40                              | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.54                   | 1.72          | 56.30                               | 1,000                                       | 2,000                             | 11.00                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.54                   | 1.89          | 35.00                               | 1,000                                       | 2,000                             | 14.60                             | 305(1,000)           |
|          | 1.4MM      | 1/1.4                 | 1.40          | 0.57                   | 2.54          | 12.10                               | 1,000                                       | 2,000                             | 28.50                             | 305(1,000)           |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 150°C, single-wire in air
- 2) Conductor : Tin coated soft annealed copper wire

## 5-11 Teflon Wire

Teflon (FEP) insulated wire

### UL Style No.1332 CSA Type AWM

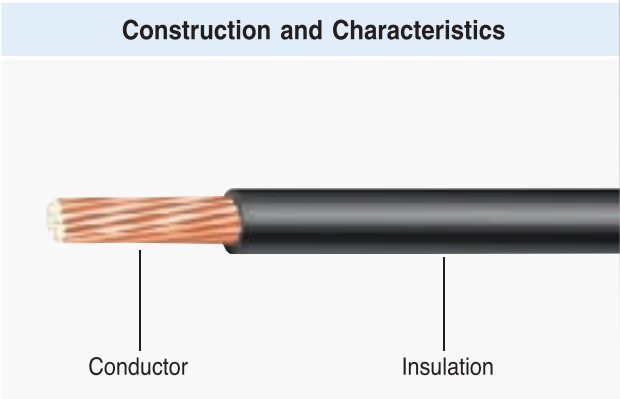
- Rating     UL : 300V, 200°C / CSA : 300V, 200°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

1. Internal wiring of electrical and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. Can be replaced by Silicon glass fiber braided wire(UL3122, SF-1).
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1332 E52853 VW-1  AWM 200C LL57184 CSA AWM I A/B 200C 300V FT1 AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.35                   | 1.08          | 223.00                              | 1,000                                       | 2,000                             | 239.00                            | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.35                   | 1.18          | 139.00                              | 1,000                                       | 2,000                             | 150.00                            | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.35                   | 1.31          | 85.90                               | 1,000                                       | 2,000                             | 94.20                             | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.35                   | 1.46          | 54.70                               | 1,000                                       | 2,000                             | 59.40                             | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.35                   | 1.66          | 34.40                               | 1,000                                       | 2,000                             | 36.70                             | 610(2,000)           |
|          | 18         | 19/0.254              | 1.28          | 0.35                   | 1.98          | 20.30                               | 1,000                                       | 2,000                             | 23.20                             | 610(2,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.35                   | 2.14          | 21.40                               | 1,000                                       | 2,000                             | 14.60                             | 610(2,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.35                   | 2.52          | 15.80                               | 1,000                                       | 2,000                             | 8.96                              | 610(2,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 28         | 1/0.320               | 0.32          | 0.35                   | 1.02          | 232.00                              | 1,000                                       | 2,000                             | 227.00                            | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.35                   | 1.10          | 145.00                              | 1,000                                       | 2,000                             | 143.00                            | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.35                   | 1.21          | 89.10                               | 1,000                                       | 2,000                             | 89.30                             | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.35                   | 1.34          | 56.30                               | 1,000                                       | 2,000                             | 56.40                             | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.35                   | 1.51          | 35.00                               | 1,000                                       | 2,000                             | 35.20                             | 610(2,000)           |

- Remarks   1) Allowable current: Ambient temperature 40°C, Max. allowable temperature 200°C, single-wire in air
- 2) TA : Tin coated soft annealed copper wire
- GA : Silver coated soft annealed copper wire
- NA : Nickel coated soft annealed copper wire
- 3) TA : It can be used when diameter of strand is 0.381mm or larger

## 5-12 Teflon Wire

Teflon (FEP) insulated wire

### UL Style No.1333 CSA Type AWM

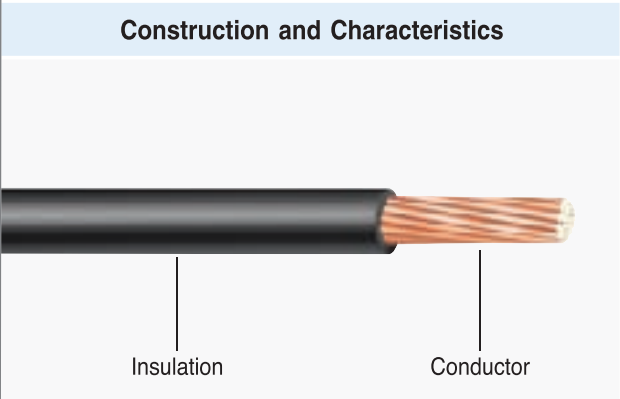
- Rating     UL : UL : 300V, 150°C / CSA : 300V, 150°C
- Standard   UL : UL Subject 758 / CSA : CSA C22.2 NO.210-2

#### Application

1. Internal wiring of electrical and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. Can be replaced by Silicon glass fiber braided wire (UL3068, SFF-1).
5. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1333 E52853 VW-1  AWM 150C LL57184 CSA AWM I A/B 150C 300V FT1 AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Allowable Current (reference) (A) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.35                   | 1.08          | 223.00                              | 1,000                                       | 2,000                             | 4.20                              | 305(1,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.35                   | 1.18          | 139.00                              | 1,000                                       | 2,000                             | 5.60                              | 305(1,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.35                   | 1.31          | 85.90                               | 1,000                                       | 2,000                             | 7.50                              | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.35                   | 1.46          | 54.70                               | 1,000                                       | 2,000                             | 10.00                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.35                   | 1.66          | 34.40                               | 1,000                                       | 2,000                             | 13.40                             | 305(1,000)           |
|          | 18         | 19/0.254              | 1.28          | 0.35                   | 1.98          | 20.30                               | 1,000                                       | 2,000                             | 19.30                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.35                   | 2.14          | 15.80                               | 1,000                                       | 2,000                             | 23.70                             | 305(1,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.35                   | 2.52          | 10.00                               | 1,000                                       | 2,000                             | 32.20                             | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |
| Solid    | 28         | 1/0.320               | 0.32          | 0.35                   | 1.02          | 232.00                              | 1,000                                       | 2,000                             | 4.20                              | 305(1,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.35                   | 1.10          | 145.00                              | 1,000                                       | 2,000                             | 5.60                              | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.35                   | 1.21          | 89.10                               | 1,000                                       | 2,000                             | 7.50                              | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.35                   | 1.34          | 56.30                               | 1,000                                       | 2,000                             | 10.40                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.35                   | 1.51          | 35.00                               | 1,000                                       | 2,000                             | 13.40                             | 305(1,000)           |
|          | 1.4SQ      | 55/0.180              | 1.54          | 0.35                   | 2.24          | 14.20                               | 1,000                                       | 2,000                             | 32.20                             | 305(1,000)           |
|          | 1.25SQ     | 50/0.180              | 1.47          | 0.35                   | 2.17          | 15.60                               | 1,000                                       | 2,000                             | 23.70                             | 305(1,000)           |
|          | 0.75SQ     | 30/0.180              | 1.14          | 0.35                   | 1.84          | 26.00                               | 1,000                                       | 2,000                             | 13.40                             | 305(1,000)           |
|          | 0.5SQ      | 20/0.180              | 0.93          | 0.35                   | 1.63          | 39.00                               | 1,000                                       | 2,000                             | 10.00                             | 305(1,000)           |
|          | 0.3SQ      | 12/0.180              | 0.72          | 0.35                   | 1.42          | 65.00                               | 1,000                                       | 2,000                             | 7.50                              | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                             |                                   |                                   |                      |

- Remarks   1) Allowable current : Ambient temperature 40°C, Max. allowable temperature 150°C, single-wire in air
- 2) Conductor : Tin coated soft annealed copper wire

## 5-13 Teflon Wire

Teflon (PFA) insulated wire

### UL Style No.1709

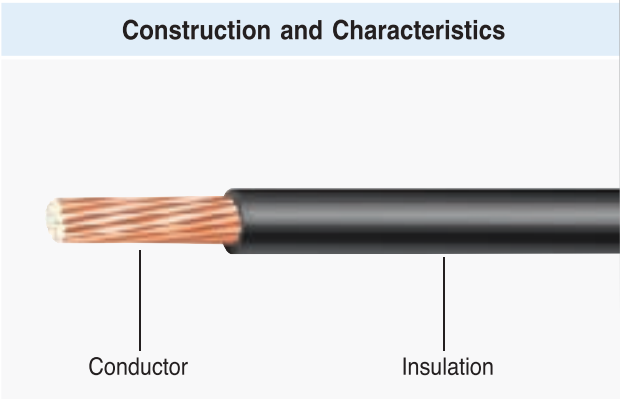
- Rating     UL : 300V, 200°C
- Standard   UL : UL Subject 758

#### Application

1. Suitable for electric and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Max. Cond. Resistance (20°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|--------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                      |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.36                   | 1.10          | 239.00                              | 1,000                                | 2,000                             | 610(2,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.36                   | 1.20          | 139.00                              | 1,000                                | 2,000                             | 610(2,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.36                   | 1.33          | 85.90                               | 1,000                                | 2,000                             | 610(2,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.36                   | 1.48          | 54.70                               | 1,000                                | 2,000                             | 610(2,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.36                   | 1.68          | 34.40                               | 1,000                                | 2,000                             | 610(2,000)           |
|          | 18         | 19/0.254              | 1.21          | 0.36                   | 1.99          | 20.30                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.36                   | 2.16          | 15.80                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.36                   | 2.53          | 10.00                               | 1,000                                | 2,000                             | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                      |                                   |                      |
| Solid    | 28         | 1/0.320               | 0.32          | 0.36                   | 1.04          | 232.00                              | 1,000                                | 2,000                             | 610(2,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.36                   | 1.12          | 145.00                              | 1,000                                | 2,000                             | 610(2,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.36                   | 1.23          | 89.10                               | 1,000                                | 2,000                             | 610(2,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.36                   | 1.36          | 56.30                               | 1,000                                | 2,000                             | 610(2,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.36                   | 1.53          | 35.00                               | 1,000                                | 2,000                             | 610(2,000)           |

► Remarks   1) Conductor : Silver coated soft annealed copper wire, Nickel coated soft annealed copper wire

## 5-14 Teflon Wire

Teflon (PFA) insulated wire

### UL Style No.1710

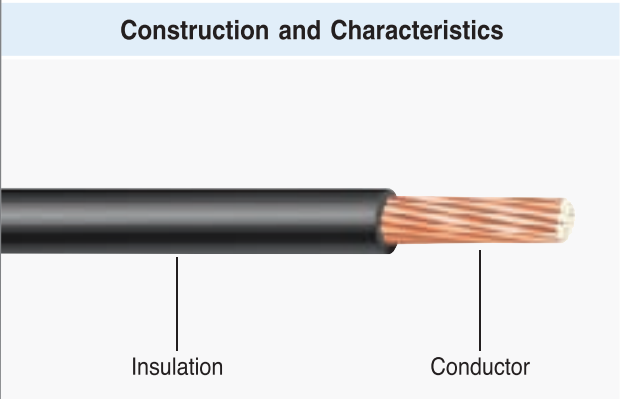
- Rating     UL : 600V, 200°C
- Standard   UL : UL Subject 758

#### Application

1. Suitable for electric and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Max. Cond. Resistance (20°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|--------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                      |                                   |                      |
| Stranded | 26         | 7/0.160               | 0.48          | 0.55                   | 1.58          | 139.00                              | 1,000                                | 2,000                             | 305(1,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.55                   | 1.71          | 85.90                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.55                   | 1.86          | 54.70                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.55                   | 2.06          | 34.40                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 18         | 19/0.254              | 1.21          | 0.55                   | 2.37          | 20.30                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.55                   | 2.54          | 15.80                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.55                   | 2.91          | 10.00                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 12         | 37/0.320              | 2.24          | 0.55                   | 3.34          | 6.59                                | 1,000                                | 2,000                             | 305(1,000)           |
|          |            |                       |               |                        |               |                                     |                                      |                                   |                      |
| Solid    | 26         | 1/0.404               | 0.40          | 0.55                   | 1.50          | 145.00                              | 1,000                                | 2,000                             | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.55                   | 1.61          | 89.10                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.55                   | 1.74          | 56.30                               | 1,000                                | 2,000                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.55                   | 1.91          | 35.00                               | 1,000                                | 2,000                             | 305(1,000)           |

► Remarks   1) Conductor : Silver coated soft annealed copper wire, Nickel coated soft annealed copper wire



## 5-15 Teflon Wire

Teflon (PFA) insulated wire

### UL Style No.1726

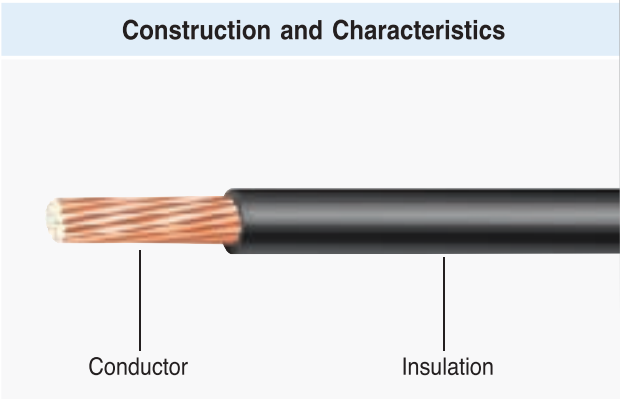
- Rating     UL : 300V, 250°C
- Standard   UL : UL Subject 758

#### Application

1. Suitable for electric and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



#### Marking

1726 E52853 VW-1  AWM 250C AWG NO. LS Cable

| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 28         | 7/0.127               | 0.38          | 0.37                   | 1.12          | 239.00                              | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.37                   | 1.22          | 139.00                              | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.37                   | 1.35          | 85.90                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.37                   | 1.50          | 54.70                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.37                   | 1.70          | 34.40                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 18         | 19/0.254              | 1.21          | 0.37                   | 2.01          | 20.30                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.37                   | 2.18          | 15.80                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 14         | 19/0.361              | 1.82          | 0.37                   | 2.55          | 10.00                               | 1,000                                       | 2,000                             | 305(1,000)           |
| Solid    | 28         | 1/0.320               | 0.32          | 0.37                   | 1.06          | 232.00                              | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.37                   | 1.14          | 145.00                              | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.37                   | 1.25          | 89.10                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.37                   | 1.38          | 56.30                               | 1,000                                       | 2,000                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.37                   | 1.55          | 35.00                               | 1,000                                       | 2,000                             | 305(1,000)           |

► Remarks 1) Conductor : Silver coated soft annealed copper wire, Nickel coated soft annealed copper wire

## 5-16 Teflon Wire

Teflon (PFA) insulated wire

### UL Style No.1860

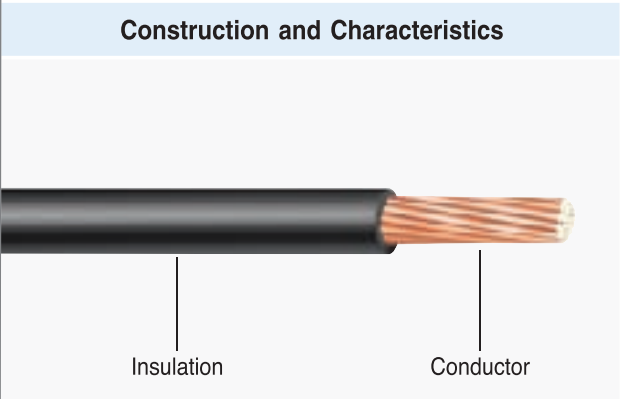
- Rating     UL : 150V, 200°C
- Standard   UL : UL Subject 758

#### Application

1. Suitable for electric and electronic equipments requiring heat resistance.
2. Internal wiring of computer and business equipments requiring high transmission velocity.

#### Features

1. Flame retardant : UL VW-1
2. Excellent heat, cold, oil and chemical resistance.
3. Stable electric characteristics at high temperature and frequency and, small dielectric constant and dielectric loss.
4. EU Directive RoHS : Restricted use of Pb, Cd, Hg, Cr+6, PBBs, PBDEs



| Type     | Conductor  |                       |               | Insulation             |               | Max. Cond. Resistance (20°C) (Ω/km) | Min. Insulation Resistance (15.6°C) (MΩ·km) | Dielectric Strength (AC) (V/1min) | Unit Length (m) (ft) |
|----------|------------|-----------------------|---------------|------------------------|---------------|-------------------------------------|---------------------------------------------|-----------------------------------|----------------------|
|          | Size (AWG) | Construction (No./mm) | Diameter (mm) | Nominal Thickness (mm) | Diameter (mm) |                                     |                                             |                                   |                      |
| Stranded | 30         | 7/0.102               | 0.31          | 0.28                   | 0.87          | 354.00                              | 500                                         | 2,000                             | 305(1,000)           |
|          | 28         | 7/0.127               | 0.38          | 0.28                   | 0.94          | 239.00                              | 500                                         | 2,000                             | 305(1,000)           |
|          | 26         | 7/0.160               | 0.48          | 0.28                   | 1.04          | 139.00                              | 500                                         | 2,000                             | 305(1,000)           |
|          | 24         | 7/0.203               | 0.61          | 0.28                   | 1.17          | 85.90                               | 500                                         | 2,000                             | 305(1,000)           |
|          | 22         | 7/0.254               | 0.76          | 0.28                   | 1.32          | 54.70                               | 500                                         | 2,000                             | 305(1,000)           |
|          | 20         | 7/0.320               | 0.96          | 0.28                   | 1.52          | 34.40                               | 500                                         | 2,000                             | 305(1,000)           |
|          | 18         | 19/0.254              | 1.21          | 0.28                   | 1.83          | 20.30                               | 500                                         | 2,000                             | 305(1,000)           |
|          | 16         | 19/0.287              | 1.44          | 0.28                   | 2.00          | 15.80                               | 500                                         | 2,000                             | 305(1,000)           |
| Solid    | 30         | 1/0.254               | 0.25          | 0.28                   | 0.81          | 373.00                              | 500                                         | 2,000                             | 305(1,000)           |
|          | 28         | 1/0.320               | 0.32          | 0.28                   | 0.88          | 232.00                              | 500                                         | 2,000                             | 305(1,000)           |
|          | 26         | 1/0.404               | 0.40          | 0.28                   | 0.96          | 145.00                              | 500                                         | 2,000                             | 305(1,000)           |
|          | 24         | 1/0.511               | 0.51          | 0.28                   | 1.07          | 89.10                               | 500                                         | 2,000                             | 305(1,000)           |
|          | 22         | 1/0.643               | 0.64          | 0.28                   | 1.20          | 56.30                               | 500                                         | 2,000                             | 305(1,000)           |
|          | 20         | 1/0.813               | 0.81          | 0.28                   | 1.37          | 35.00                               | 500                                         | 2,000                             | 305(1,000)           |

► Remarks 1) Conductor : Silver coated soft annealed copper wire, Nickel coated soft annealed copper wire

## UL & CSA Standards

### 1. UL Standards

UL is an abbreviation for the Underwriters Laboratories Inc., a non-profit organization established in 1894 with the support of the National Board of Fire Underwriters, USA, for the purpose of public testing.

To protect human lives and property from fire and electric shock caused by defective products, burglary and other misfortunes, UL researches, tests, and inspects electric equipment, fire prevention products, gas products, petroleum products, chemical products, burglary-prevention products, and other products to provide an approval service. It also seeks to maintain the safety of product through a follow-up service.

Products earn the conformance certificate label issued from the UL head office when they have passed the UL list tests. This safety rating is highly valued in the USA. Accordingly, underwriters, agencies of the federal, state and municipal governments, manufacturers, contractors and others strongly demand UL list as a condition for acceptance or procurement.

All products to be shipped to the USA must obtain UL approval.

### 2. CSA Standards

CSA is an abbreviation for the Canadian Standard Association. It was established as a private non-profit agency in 1919 under the name of the Canadian Engineering Standards Association based on the Dominion Companies Act.

This name was replaced by the present short form in 1944 after expanding its standardization activities to a wide range of products. In addition to preparing standards this agency issues the CSA mark or the conformance certificate label to electric equipment and oil combustion units submitted for testing if the survey and test results show that the products conform to relevant laws, regulations, and CSA standards.

Law in Canada requires that all electric devices and Petroleum combustion units in domestic markets bear the CSA mark or the conformance certificate label.

## UL & CSA Certificate Labels

### 1. Attachment of Labels to Products

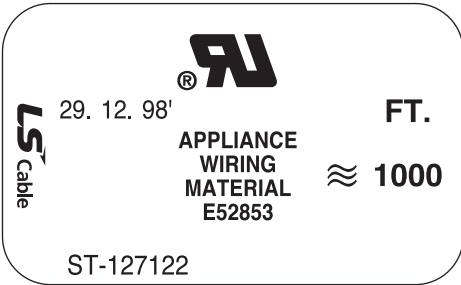
LS Cable Ltd. attaches the labels to the rear of the exclusive tags of UL recognized and CSA certified wires. Exclusive tags for both UL and CSA are attached to products recognized and certified by both institutions.

### 2. Handling of Labels

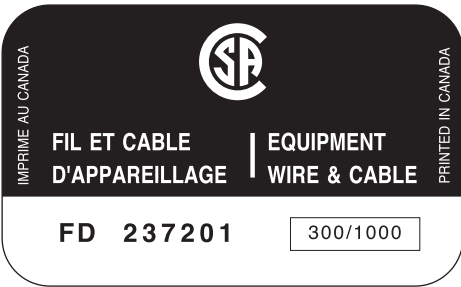
The UL and CSA conformance certificate labels are employed to certify that products conform to the respective approval agencies' testing. Pay particular attention to the following items.

- 1) Store the labels carefully until the electric units employing the wires have completed the UL or CSA witnessed tests.
- 2) LS Cable Ltd. will not issue the conformance certificate label again after products have been shipped.
- 3) These UL and CSA labels cannot be attached to other wires (products not conforming to UL or CSA standards).
- 4) The labels are shown in the illustrations on the right.

UL AWM



CSA



## Marking of UL & CSA Approved Wires

The respective standards are indicated on UL recognized and CSA certified wires. However, they are not indicated on wires of small outer diameter, on which printing is difficult.

### 1. Marking

- 1) Product classification based on UL standards :  AWM
- 2) UL style No.
- 3) Product classification based on CSA standards : Type No. and AWM (CSA certified product only)
- 4) Manufacturer's name : 
- 5) Rated temperature and rated voltage (AC) specified by UL and CSA standards.

(Note) If these indications are not required for certain products according to UL and CSA standards, they may be omitted.

- 6) Flammability : VW-1, VW-1SC, -F-
  - VW-1 : Indicated on products which have passed the Vertical Flammability Test and Horizontal Flammability Test specified by UL standards.
  - VW-1SC : Indicated on shielded wires or multi-conductor cable products where both finished products and insulated conductors have passed the Vertical Flammability Test and Horizontal Flammability Test specified by UL standards.
  - -F- : Indicated on products that have passed the Flammability Test required for internal wiring materials for TV receivers and are already registered with the Japan Electrical Appliance and Material Control Law (JEAMCL).
- 7) Conductor size : AWG size
- 8) Others

### 2. LS Cable's UL Recognized CSA Certified Number (File No.)

| UL                              |          |
|---------------------------------|----------|
| Type                            | File No. |
| Appliance Wiring Material (AWM) | E52853   |
| Flexible Cord                   | E52854   |

| CSA                             |                |          |
|---------------------------------|----------------|----------|
| Type                            |                | File No. |
| Radio Circuit Wire              | TR-64, TR-32   | LL33908  |
| Equipment Wire                  | TEW, REW       | LL33911  |
| Coil Lead Wire                  | CL1251, CL1252 | LL57183  |
| Appliance Wiring Material (AWM) |                | LL57183  |
| Flexible Cord                   |                | LL33910  |

## Definition of UL Style Numbers

| Group | Style No. | Insulation Material     | Core         | Products                                   |
|-------|-----------|-------------------------|--------------|--------------------------------------------|
| 1     | 1001~1999 | Thermoplastic (PVC, PE) | Single       | Lead Wire / Teflon Wire / Coaxial Cable    |
| 2     | 2001~2999 | Thermoplastic (PVC, PE) | Multiple     | Computer Cable / Flat Cable / Cord, Feeder |
| 3     | 3001~3999 | Thermoset (XLPVC, XLPE) | Single       | Irradiated Wire (XLPVC, XLPE)              |
| 4     | 4001~4999 | Thermoset (XLPVC, XLPE) | Mutiple      | Irradiated Cable (XLPVC, XLPE)             |
| 5     | 5001~5999 | Micellaneous (PVC, PE)  | Micellaneous | Composite Wire & Cable (Fiber, PBT, PST)   |

## Restrictions on the Use of UL & CSA Approved Wires

Wrong use and application of wires and cables not only shorten their lives but may also cause a serious accident. To prevent fires and electric shock, UL and CSA standards impose restrictions on the use of wires and cables based on NEC (National Electrical Code) or CEC (Canadian Electrical Code). The restrictions are specified on product tags.

### 1. Use Restrictions

- 1) Restrictions on internal and external wiring, wires and cables are classified into three types as follows.
- Those which can be employed for internal wiring of electronic equipments only.
  - Those which can be employed for external wiring of electronic equipments only.
  - Those which can be employed for both internal wiring and external wiring of electronic equipments. If it is difficult to distinguish between the internal and external wiring, it is recommended to use a wire for both internal wiring and external wiring.
- 2) Peak voltage limits
- The peak voltages allowed for wires and cables of rated voltage other than 30V are specified in the following table based on UL and CSA standards. When these peak voltage are applied, the cautions required for the wiring of each UL electronic device must be observed.

Peak voltages for various rated voltages

| Rated voltage (VAC) | Peak voltage |              |
|---------------------|--------------|--------------|
|                     | UL standard  | CSA standard |
| 125 & 150           | 300          | -            |
| 300                 | 600          | 600          |
| 600                 | 2,500        | 1,400        |

### 2. Circuit Restrictions

- 1) Fire hazard
- A fire hazard exists if the open voltage of a circuit which feeds more than 15 watts of power to an external resistance exceeds:
- 42.4V peak when the circuit is in danger of touching an indoor unit or water.
  - 21.2V peak when the circuit may touch an outdoor unit or water.
- 2) Electric shock hazard
- Electric shock hazard exists when the open voltage between an exposed part and the ground or other easily touchable part is as specified below.
- 42.4V peak for an indoor unit with no possibility of touching water.
  - 21.2V peak when there is the possibility of touching an outdoor unit or water. And electric shock hazard also exists where the current continuously flowing through a 500Ω resistor exceeds values specified in the following table.

Maximum allowable current (electric shock)

| Frequency (Hz)    | Maximum allowable current (mA) flowing through a 500Ω resistor |
|-------------------|----------------------------------------------------------------|
| 0 - 100           | 7.1                                                            |
| 500               | 9.4                                                            |
| 1,000             | 11.0                                                           |
| 2,000             | 14.1                                                           |
| 3,000             | 17.3                                                           |
| 4,000             | 19.6                                                           |
| 5,000             | 22.0                                                           |
| 6,000             | 25.1                                                           |
| Higher than 7,000 | 27.5                                                           |

## Registration in Accordance with JQA Equipment Inflammability (-F- Mark)

### 1. Registration

Internal wiring materials for TV receivers and portable TV cameras cannot be used unless they conform to the Japan Electrical Appliance and Material Control Low. Each manufacturer registers the electrical products by requesting JMI to conduct the inflammability test.

### 2. LS Cable's Product Types for Inflammability Registration.

| Type                              | Style No. | Size (AWG)    | Registration No. |
|-----------------------------------|-----------|---------------|------------------|
| Heat-resistant vinyl wire         | UL1007    | All Size      | GSC 1-001        |
|                                   | UL1061    |               | GSC 1-001        |
|                                   | UL1275    |               | GSC 1-003        |
|                                   | UL1015    |               | GSC 1-002        |
|                                   | UL1032    |               | GSC 1-002        |
|                                   | UL1283    |               | GSC 1-003        |
| Flat cable                        | UL2877    | 20AWG or less | GSC 1-015, 016   |
|                                   | UL2878    |               | GSC 1-015, 016   |
|                                   | UL2468    |               | GSC 1-015, 016   |
|                                   | UL2651    |               | GSC 1-015, 016   |
| High voltage wire                 | UL3239    | 26AWG or more | GSC 1-005, 007   |
| Irradiation cross-link vinyl wire | UL1429    | All Size      | GSC 1-001        |
|                                   | UL1430    |               | GSC 1-001        |
|                                   | UL1571    |               | GSC 1-001        |
| Double insulated wire             | UL1672    | All Size      | GSC 1-001        |
|                                   | UL1618    | 20-26AWG      | GSC 1-001        |
|                                   | UL1617    | 26AWG or more | GSC 1-002        |

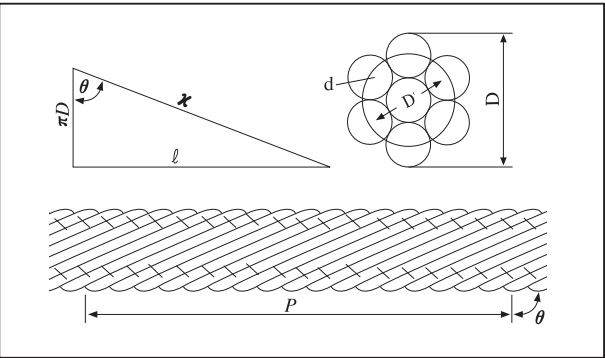
| Type                                             | Style No. | Size (AWG)    | Registration No. |
|--------------------------------------------------|-----------|---------------|------------------|
| Heat-resistant vinyl shielded wire               | UL1185    | All Size      | GSC 1-014        |
|                                                  | UL1533    | 20AWG or less | GSC 1-014        |
|                                                  | UL2405    | 26AWG or less | GSC 1-017        |
|                                                  | UL2547    | 20AWG or less | GSC 1-017        |
| Irradiation cross-link polyethylene wire         | UL3265    | All Size      | GSC 1-005        |
|                                                  | UL3266    | All Size      | GSC 1-005        |
|                                                  | UL3271    | 26AWG or less | GSC 1-007        |
|                                                  | UL3273    | 26AWG or less | GSC 1-007        |
| Irradiation polyethylene insulated shielded wire | UL3321    | 26AWG or less | GSC 1-007        |
|                                                  |           |               |                  |
| Irradiation polyethylene insulated shielded wire | UL1691    | 20AWG or less | GSC 1-004        |
|                                                  | UL2791    |               | GSC 1-010        |
| Polyethylene insulated coaxial cable             |           | All Size      |                  |
|                                                  |           |               |                  |
|                                                  | UL1365    | All Size      | GSC 1-006, 008   |
|                                                  | UL1354    |               | GSC 1-006, 008   |



Construction of Stranded Conductors

1. Types of Conductors

- Solid Wires
- Concentric Stranded Wire
- Bunched Stranded Wire : Flexible
- Rope Lay Stranded Wire : Bunched Stranded Wires cabled into single construction.



2. Pitch and Stranding Ratio of Stranded Wire

Assume the following symbols for a circular stranded wire :  
d : Wire Diameter  
D' : Pitch Diameter (circle is referred to as the pitch circle)  
D : Outer diameter of stranded wire  
P : Lay-axial length of wire required for one strand to complete one revolution.  
 $\chi$  : Axial length of strand required to complete one revolution

Stranding Ratio  
$$= \frac{\chi}{P} - 1 = \sqrt{\left(\frac{\pi D'}{P}\right)^2 + 1} - 1 = \frac{1}{2} \left(\frac{\pi D'}{P}\right)^2 - \frac{1}{8} \left(\frac{\pi D'}{P}\right)^4 + \dots$$

Gradient angle of Strand :  $\theta = \sin^{-1} \left( \frac{P}{\chi} \right)$

3. Standard Conductor Chart

AWG Size

| Size (AWG) | Solid Wire | Concentric Stranding | Bunched Stranding / Rope Lay Stranding | Rope Lay Stranding |
|------------|------------|----------------------|----------------------------------------|--------------------|
| 36         | 1/0.127    | 7/0.05               | 7/0.05                                 | -                  |
| 32         | 1/0.203    | 7/0.08               | 7/0.08                                 | -                  |
| 30         | 1/0.26     | 7/0.102              | 7/0.102                                | -                  |
| 28         | 1/0.32     | 7/0.127              | 7/0.127                                | 3/16/0.05          |
| 26         | 1/0.404    | 7/0.16               | 7/0.16                                 | 3/23/0.05          |
| 24         | 1/0.511    | 7/0.203              | 11/0.16                                | 7/16/0.05          |
| 22         | 1/0.644    | 7/0.26               | 17/0.16                                | 7/25/0.05          |
| 20         | 1/0.813    | 7/0.32               | 26/0.16                                | 7/38/0.05          |
| 18         | 1/1.024    | 19/0.26              | 43/0.16                                | 7/61/0.05          |
| 16         | 1/1.29     | 19/0.287             | 54/0.18                                | 7/96/0.05          |
| 14         | 1/1.628    | 19/0.361             | 41/0.26                                | -                  |
| 12         | 1/2.052    | 37/0.32              | 65/0.26                                | -                  |
| 10         | 1/2.588    | 37/0.404             | 104/0.26                               | -                  |
| 8          | -          | -                    | 7/24/0.26                              | -                  |
| 6          | -          | -                    | 7/28/0.26                              | -                  |
| 4          | -          | -                    | 7/60/0.26                              | -                  |
| 2          | -          | -                    | 19/35/0.26                             | -                  |
| 1          | -          | -                    | 19/44/0.26                             | -                  |
| 1/0        | -          | -                    | 19/55/0.26                             | -                  |
| 2/0        | -          | -                    | 19/70/0.26                             | -                  |
| 3/0        | -          | -                    | 19/88/0.26                             | -                  |
| 4/0        | -          | -                    | 37/57/0.26                             | -                  |

(No./mm, No./No./mm)

KS / JIS Size

| Size (mm <sup>2</sup> ) | Concentric Stranding | Bunched Stranding / Rope Lay Stranding |
|-------------------------|----------------------|----------------------------------------|
| 0.035                   | 7/0.08               | 7/0.08                                 |
| 0.05                    | 7/0.1                | 7/0.1                                  |
| 0.1                     | 7/0.14               | 7/0.14                                 |
| 0.14                    | 7/0.16               | 7/0.16                                 |
| 0.18                    | 7/0.18               | 7/0.18                                 |
| 0.2                     | 7/0.2                | 7/0.2                                  |
| 0.3                     | 7/0.26               | 12/0.18                                |
| 0.5                     | 7/0.32               | 19/0.18                                |
| 0.75                    | -                    | 30/0.18                                |
| 1.25                    | 7/0.45               | 50/0.18                                |
| 2                       | 7/0.6                | 37/0.26                                |
| 3.5                     | 7/0.8                | 45/0.32                                |
| 5.5                     | 7/1.0                | 35/0.45                                |
| 8                       | 7/1.2                | 50/0.45                                |
| 14                      | 7/1.6                | 88/0.45                                |
| 22                      | 7/2.0                | 7/20/0.45                              |
| 38                      | 7/2.6                | 7/34/0.45                              |
| 60                      | 19/2.0               | 19/20/0.45                             |
| 100                     | 19/2.6               | 19/34/0.45                             |

(No./mm, No./No./mm)

General Characteristics of Insulation Materials

| Material                   |                                        | PVC Resin                          |                                    |                  | Polyethylene               |                            |                            | Fluorine Resin   |                     |                              |                          |                         |                  | Flame Resistant Polyfiex | Polyamide      |
|----------------------------|----------------------------------------|------------------------------------|------------------------------------|------------------|----------------------------|----------------------------|----------------------------|------------------|---------------------|------------------------------|--------------------------|-------------------------|------------------|--------------------------|----------------|
|                            |                                        | PVC                                | Heat Resistant PVC                 | Cross-linked PVC | Polyethylene               | Cross-linked Polyethylene  |                            | Polypropylene    | Vinylidene Fluoride | Ethylene-tetrafluoroethylene | Fluoroethylene Propylene | Polytetrafluoroethylene | Perfluoroalcoxy  |                          | Fluonlex       |
| Characteristics            |                                        | PVC                                | H-PVC                              | XL PVC           | PE                         | XLPE                       | PP                         | PVdF             | ETFE                | FEP                          | PTFE                     | PFA                     | LEF              | -                        | NY             |
| Electrical                 | Dielectric Strength (kV/mm)            | 20~35                              | 20~35                              | 25~40            | 35~50                      | 35~50                      | 35~50                      | 20~35            | 20~35               | 15~30                        | 20~30                    | 20~35                   | 20~30            | 20~39                    | -              |
|                            | Volume Resistivity (Ω/cm)              | 10 <sup>12</sup> ~10 <sup>15</sup> | 10 <sup>12</sup> ~10 <sup>15</sup> | 10 <sup>18</sup> | 10 <sup>18</sup>           | 10 <sup>18</sup>           | 10 <sup>18</sup>           | 10 <sup>14</sup> | >10 <sup>16</sup>   | >10 <sup>18</sup>            | >10 <sup>18</sup>        | >10 <sup>18</sup>       | 10 <sup>15</sup> | 10 <sup>14</sup>         | -              |
|                            | Dielectric Constant                    | 6~8                                | 6~8                                | 3.5~5            | 2.3                        | 2.3                        | 2.3                        | 3.5~8            | 2.6                 | 2.1                          | 2.1                      | 2.1                     | 3.8              | 5~6                      | -              |
|                            | Dielectric Power Factor (%)            | 4~12                               | 4~12                               | 3~10             | 0.02~0.05                  | 0.02~0.05                  | 0.02~0.05                  | 5~25             | 0.2                 | 0.03                         | 0.02                     | 0.02                    | -                | 2~3                      | -              |
| Mechanical                 | Tensile Strength (kg/mm <sup>2</sup> ) | 1.0~2.5                            | 1.0~2.5                            | 1.5~3.0          | 1.2~1.5                    | 1.2~1.5                    | 2.5~3.5                    | 7~8              | 6~7                 | 6~7                          | 1.5~3.0                  | 1.5~3.0                 | 1.6              | 1.5~2.0                  | 4~7            |
|                            | Elongation (%)                         | 100~400                            | 100~400                            | 100~300          | 500~700                    | 200~500                    | 500~700                    | 350~450          | 200~300             | 100~300                      | 100~300                  | 100~300                 | 350              | 500~600                  | 100~300        |
| Specific Gravity           |                                        | 1.25~1.40                          | 1.25~1.40                          | 1.25~1.40        | 0.92~0.95                  | 0.92~0.95                  | 0.89~0.90                  | 1.77             | 1.7                 | 2.2                          | 2.2                      | 2.2                     | 1.7              | 1.2~1.3                  | 1.1~1.5        |
| Softening Temperature (°C) |                                        | 120                                | 150                                | -                | 105~115                    | -                          | 160                        | 149              | 270                 | 285                          | 327                      | 305                     | -                | -                        | 230            |
| Rated Temperature (°C)     |                                        | 60                                 | 75~105                             | 105              | 75                         | 105~125                    | 105                        | 105              | 150                 | 200                          | 250                      | 250                     | 200              | 105                      | 90             |
| Flame Retardant            |                                        | Very Good                          | Very Good                          | Very Good        | Unsatisfactory             | Unsatisfactory             | Unsatisfactory             | Excellent        | Excellent           | Excellent                    | Excellent                | Excellent               | Excellent        | Excellent                | Unsatisfactory |
| Heat Resistance            | Aging Resistance                       | Fair                               | Good                               | Very Good        | Good                       | Very Good                  | Very Good                  | Excellent        | Excellent           | Excellent                    | Excellent                | Excellent               | Excellent        | Very Good                | Very Good      |
|                            | Heat Deformation Resistance            | Fair                               | Fair                               | Excellent        | Fair                       | Excellent                  | Good                       | Excellent        | Excellent           | Excellent                    | Excellent                | Excellent               | Good             | Very Good                | Very Good      |
| Cold Resistance            |                                        | Fair                               | Fair                               | Fair             | Very Good                  | Very Good                  | Fair                       | Excellent        | Excellent           | Excellent                    | Excellent                | Excellent               | Excellent        | Excellent                | Fair           |
| Weather Resistance         |                                        | Excellent                          | Excellent                          | Excellent        | Unsatisfactory (Excellent) | Unsatisfactory (Excellent) | Unsatisfactory (Excellent) | Excellent        | Excellent           | Excellent                    | Excellent                | Excellent               | Excellent        | Excellent                | Good           |
| Ozone Resistance           |                                        | Excellent                          | Excellent                          | Excellent        | Excellent                  | Excellent                  | Excellent                  | Excellent        | Excellent           | Excellent                    | Excellent                | Excellent               | Excellent        | Excellent                | Very Good      |
| Oil Resistance             |                                        | Good                               | Good                               | Good             | Good                       | Excellent                  | Excellent                  | Excellent        | Highly Excellent    | Highly Excellent             | Highly Excellent         | Highly Excellent        | Excellent        | Good                     | Very Good      |
| Acid Resistance            |                                        | Excellent                          | Excellent                          | Excellent        | Excellent                  | Excellent                  | Good                       | Excellent        | Excellent           | Highly Excellent             | Highly Excellent         | Excellent               | Excellent        | Excellent                | Fair           |
| Alkali Resistance          |                                        | Excellent                          | Excellent                          | Excellent        | Excellent                  | Excellent                  | Excellent                  | Excellent        | Excellent           | Highly Excellent             | Highly Excellent         | Excellent               | Excellent        | Excellent                | Good           |

General Characteristics of Insulation Materials

| Material                      |                                        | Polychlorosulfonated Polyethylene (Hypalon) | Silicone Rubber           | Polychloroprene         | Ethylene Propylene Polymer |
|-------------------------------|----------------------------------------|---------------------------------------------|---------------------------|-------------------------|----------------------------|
| Symbol                        |                                        |                                             |                           |                         |                            |
| Characteristics               |                                        | CSPE                                        | SiR                       | CR                      | EPR                        |
| Chemical Composition          |                                        | Polychlorosulfonated Polyethylene           | Dimethyl Siloxane Polymer | Polychloroprene Polymer | Ethylene Propylene Polymer |
| Uses                          |                                        | Insulation, Sheath                          | Insulation                | Sheath                  | Insulation                 |
| Electrical Characteristics    | Dielectric Stength (kV/mm)             | 20~30                                       | 20~30                     | 15~25                   | 37~48                      |
|                               | Volume Resistivity (Ω/cm)              | 10 <sup>10~14</sup>                         | 10 <sup>14~15</sup>       | 10 <sup>7~12</sup>      | 10 <sup>16</sup>           |
|                               | Dielectric Power Factor                | 4~5                                         | 3~4                       | 7~10                    | 3                          |
|                               | Dielectric Constant (%)                | 3 or less                                   | 3 or less                 | 15 or less              | 15 or less                 |
| Mechanical Characteristics    | Tensile Strength (kg/mm <sup>2</sup> ) | 0.4~0.8                                     | 0.4~1.0                   | ~2.0                    | 0.9                        |
|                               | Elongation (%)                         | 200~400                                     | 100~300                   | 300~1,000               | 1,000                      |
|                               | Wear Resistance                        | Excellent                                   | Fair                      | Excellent               | Good                       |
| Specific Gravity (Raw Rubber) |                                        | 1.10                                        | 1.7                       | 1.15~1.23               | 0.86                       |
| Rated Temperature (°C)        |                                        | 90                                          | 180                       | 75                      | 90                         |
| Flame Resistance              |                                        | Good                                        | Fair                      | Excellent               | Unsatisfactory             |
| Heat Resistance               |                                        | Excellent                                   | Highly Excellent          | Good                    | Very Good                  |
| Cold Resistance               |                                        | Good                                        | Excellent                 | Fair                    | Excellent                  |
| Weather Resistance            |                                        | Excellent                                   | Excellent                 | Excellent               | Excellent                  |
| Ozone Resistance              |                                        | Highly Excellent                            | Highly Excellent          | Good                    | Highly Excellent           |
| Oil Resistance                |                                        | Good                                        | Fair                      | Good                    | Unsatisfactory             |
| Water Resistance              |                                        | Good                                        | Fair                      | Fair                    | Good                       |

Oil and Solvent Resistance of Plastic and Rubber Materials

| Material             | PVC Resin (Soft for wire) | Polyethylene | Cross-linked Polyethylene | Fluorine Resin | Fluorine Rubber | Silicone Rubber | S B R | Nitrile Rubber | Butyl Rubber | Chloroprene Rubber | Natural Rubber | Hypalon | Polyflex | Ethylene Propylene Rubber |
|----------------------|---------------------------|--------------|---------------------------|----------------|-----------------|-----------------|-------|----------------|--------------|--------------------|----------------|---------|----------|---------------------------|
| Dipping Chemicals    |                           |              |                           |                |                 |                 |       |                |              |                    |                |         |          |                           |
| Benzene              | B                         | B            | B                         | A              | C               | F               | E     | E              | E            | E                  | E              | E       | E        | D                         |
| Hexane               | C                         | B            | B                         | A              | A               | E               | E     | A              | E            | C                  | E              | C       | D        | D                         |
| Naphtha              | B                         | B            | B                         | A              | C               | E               | E     | D              | F            | E                  | E              | F       | D        | B                         |
| Gasoline             | C                         | B            | B                         | A              | B               | E               | E     | A              | F            | C                  | E              | D       | D        | B                         |
| Chloroform           | D                         | B            | B                         | A              | D               | E               | F     | G              | F            | F                  | F              | G       | E        | D                         |
| Carbon Tetrachloride | A                         | B            | B                         | A              | C               | F               | F     | C              | F            | F                  | F              | G       | E        | B                         |
| Carbon Disulfide     | B                         | B            | B                         | A              | B               | D               | F     | B              | E            | F                  | F              | F       | D        | E                         |
| Acetone              | D                         | A            | A                         | A              | C               | C               | A     | F              | A            | A                  | A              | A       | B        | A                         |
| Ethylene Glycol      | A                         | A            | A                         | A              | A               | A               | A     | A              | B            | A                  | A              | A       | A        | A                         |
| Glycerine            | A                         | A            | A                         | A              | A               | A               | A     | A              | A            | A                  | A              | A       | A        | A                         |
| Ethyl Alcohol        | A                         | A            | A                         | A              | A               | A               | A     | A              | A            | A                  | A              | A       | A        | A                         |
| Furfural             | C                         | A            | A                         | A              | C               | B               | A     | F              | A            | A                  | A              | A       | A        | B                         |
| Cresol               | B                         | A            | A                         | A              | A               | A               | B     | F              | B            | C                  | B              | C       | D        | B                         |
| Creosote Oil         | F                         | B            | B                         | A              | C               | A               | F     | G              | B            | F                  | F              | G       | C        | D                         |
| Aniline              | B                         | B            | B                         | A              | A               | A               | B     | G              | A            | D                  | B              | B       | C        | B                         |
| ASTM No.1 Oil        | A                         | A            | A                         | A              | A               | A               | B     | A              | A            | A                  | C              | A       | A        | D                         |
| ASTM No.2 Oil        | A                         | A            | A                         | A              | A               | A               | B     | A              | B            | A                  | C              | A       | B        | D                         |
| ASTM No.3 Oil        | A                         | A            | A                         | A              | A               | B               | E     | A              | D            | B                  | F              | B       | C        | E                         |
| Transformer Oil      | A                         | A            | A                         | A              | A               | B               | F     | A              | F            | B                  | F              | C       | C        | D                         |
| Silicone Oil         | A                         | A            | A                         | A              | A               | C               | A     | A              | A            | A                  | A              | A       | A        | A                         |
| Vegetable Oil        | A                         | A            | A                         | A              | A               | A               | B     | A              | A            | A                  | C              | A       | A        | A                         |
| D O P                | B                         | A            | A                         | A              | B               | A               | C     | A              | A            | E                  | C              | D       | B        | D                         |
| Petroleum Ether      | E                         | A            | A                         | A              | F               | F               | E     | C              | C            | D                  | E              | C       | C        | B                         |
| Freon 12             | A                         | A            | A                         | A              | D               | E               | E     | C              | E            | E                  | F              | D       | B        | B                         |
| Heavy Oil            | A                         | B            | B                         | A              | A               | D               | E     | A              | F            | C                  | E              | D       | C        | E                         |
| Trichlene            | B                         | B            | B                         | A              | C               | E               | F     | D              | F            | E                  | F              | E       | E        | B                         |

Remarks

1. A : Virtually no change  
B : Affected slightly  
C : Slight swelling, but no major affect  
D : Noticeable swelling. Not suitable for practical purposes except in special cases  
E : Swollen. Not suitable for practical uses  
F : Seriously swollen  
G : Maximum swelling and decomposition
2. Results will depend upon the temperature. Use this table as a general guide.

Migration of Plastic and Rubber Materials

| Insulation Material<br><br>Contact Material |                            | Name   | PVC<br>(Including<br>Cross-<br>linked<br>PVC) | Polyethy-<br>lene<br>(Including<br>Cross-<br>linked<br>Polyethylene) | Vinyl-<br>idene<br>Fluoride | TFE<br>FEP | ETFE         | Nylon      | Chloro-<br>prene<br>Rubber | Butyl<br>Rubber | Polyester |
|---------------------------------------------|----------------------------|--------|-----------------------------------------------|----------------------------------------------------------------------|-----------------------------|------------|--------------|------------|----------------------------|-----------------|-----------|
|                                             |                            |        |                                               |                                                                      |                             |            |              |            |                            |                 |           |
| Name                                        |                            | Symbol | PVC<br>(IRV)                                  | PE<br>(IRE)                                                          | PVdF<br>(KF)                | TFE<br>FEP | ETFE<br>(FH) | PA<br>(NY) | CR                         | IIR             | UP        |
| Thermosetting Substances                    | Phenol                     | PF     | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Urea                       | UF     | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Melamine                   | MF     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ×               | ○         |
|                                             | Epoxy                      | EP     | ○                                             | ×                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Unsaturated Polyester      | UP     | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Diarylphthalate            | PDAP   | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Polybutylene Terephthalate | PBT    | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Alkyd                      |        | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Noryl (denatured PPO)      | PPO    | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Silicone                   | SI     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
| Thermoplastic Substances                    | PVC                        | PVC    | ○                                             | ×                                                                    | ○                           | ○          | ○            | ○          | ×                          | ×               | ○         |
|                                             | Vinylidene Fluoride        | PVdF   | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ×                          | ×               | ○         |
|                                             | Styrene Sterol             | PS     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ×               | ○         |
|                                             | ABS                        | ABS    | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ×               | ○         |
|                                             | ABC                        | ABC    | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Polyethylene               | PE     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ×                          | ×               | ○         |
|                                             | Polypropylene              | PP     | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ×               | ○         |
|                                             | Nylon Polyamide            | PA     | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Polyacetal                 | POM    | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Polymethyl Methacrylate    | PMMA   | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ×               | ○         |
|                                             | TFE/PTFE                   | TFE    | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | FEP                        | FEP    | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | CTEF/Kel-F                 | CTFE   | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Tefzel                     | ETFE   | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Polycarbonate              | PC     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Polyether                  |        | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Ionomer                    |        | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Acetate                    | CA     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ×                          | ×               | ○         |
|                                             | Polyurethane               | PUR    | ○                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ×               | ○         |
|                                             | Natural Rubber             | NR     | ×                                             | ○                                                                    | ×                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Butyl Rubber               | IIR    | ×                                             | ×                                                                    | ×                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Silicone Rubber            | SiR    | ×                                             | ○                                                                    | ×                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Neoprene Rubber            | CR     | ×                                             | ○                                                                    | ×                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | Nitrile Rubber             | NBR    | ×                                             | ○                                                                    | ×                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | SBR Rubber                 | SBR    | ×                                             | ○                                                                    | ×                           | ○          | ○            | ○          | ○                          | ○               | ○         |
|                                             | AS                         | AS     | ×                                             | ○                                                                    | ○                           | ○          | ○            | ○          | ○                          | ○               | ○         |

Remarks

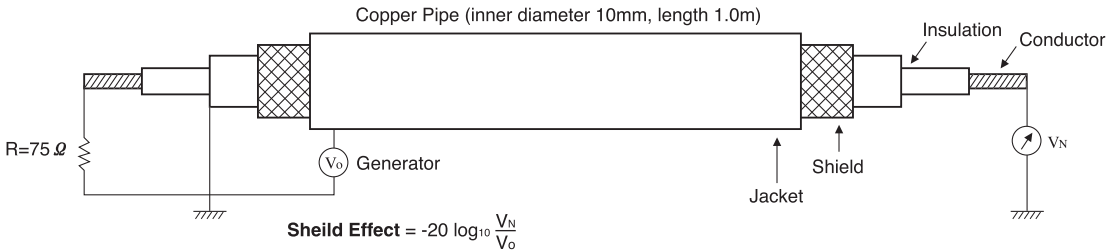
○ : No Migration / × : Migration

Migration does not always move away from the wire. It can also move towards the wire.

Shield Effect of Various Shielded Wires for Electronic Appliances

Various signal circuits and high frequency circuits for home electrical appliances use shielded wires for electrostatic shielding. These wires use electrolytic copper, aluminum foil, conductive plastic and other materials as the shielding layers. The shielding effect of these materials can be evaluated by the following testing method.

1. Shielding Effect Evaluation Method

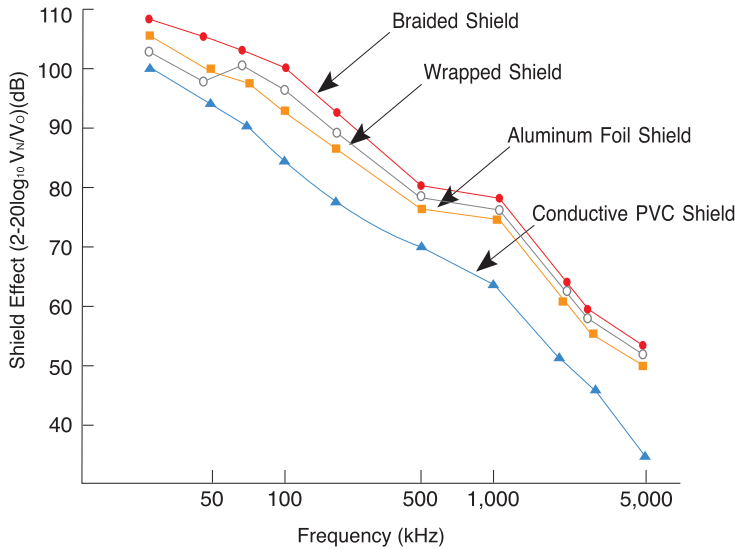


2. Wires Measured for Shield Effect

| Type of Wire                 | Type of Shield                      | Construction |
|------------------------------|-------------------------------------|--------------|
| 2.5C-2V<br>1/0.4 ϕ /         | Braided<br>(electrolytic<br>copper) |              |
| UL1691<br>-SW<br>1X24AWG     | Wrapped<br>(electrolytic<br>copper) |              |
| UL1691<br>-SX(AL)<br>1X24AWG | Aluminum<br>Foil                    |              |
| UL1691<br>-SX(PL)<br>1X24AWG | Conductive<br>PVC                   |              |

Flame-resistant irradiated cross-linked cellular polyethylene

3. Shield Effect





## Electrical Characteristics Calculation Formulations

### 1. DC Conductor Resistance

$$R = \rho \frac{l}{S} = \rho \frac{4l}{\pi d^2} (\Omega) \quad R_t = R \{1 + \alpha(t - 20)\} (\Omega)$$

$\rho$  : Volume resistivity of conductor ( $\Omega/\text{mm}$ )  
 $R$  : DC Conductor Resistance at 20°C ( $\Omega$ )  
 $R_t$  : DC Conductor Resistance at t°C ( $\Omega$ )  
 $l$  = Conductor Length (cm)  
 $d$  = Conductor Diameter (cm)  
 $S$  = Cross-sectional Area of Conductor ( $\text{cm}^2$ )  
 $\alpha$  = Temperature Coefficient  
 (annealed copper wire : 0.00393)  
 $\sigma$  = Conductivity (%)

Cross-sectional area of stranded annealed copper wire 1mm<sup>2</sup>.  
 Resistance in case of 1m in length is obtained by:

$$R = \frac{1}{58} = 0.017241$$

#### 1) DC Resistance of Single Annealed Copper Wire is

$$R = \frac{4 \times 10^3}{58 \pi d^2} (\Omega/\text{km})$$

#### 2) DC Resistance of Stranded Annealed Copper Wire is

$$R = \frac{4 \times 10^3}{58 \cdot \pi \sigma d^2 \cdot n} (1 + S) (\Omega/\text{km})$$

Where n : number of wire strands

S : Stranding Ratio - 2% for less than 60 strands  
 - 3% for more than 60 strands

#### 3) Conductivity ( $\sigma$ ) of Annealed Copper Wire

| Size       | Annealed Copper Wire | Tinned Annealed Copper Wire |
|------------|----------------------|-----------------------------|
| 0.08~0.29  | 0.98                 | 0.93                        |
| 0.291~0.45 | 0.993                | 0.94                        |
| 0.50~2.40  | 1.00                 | 0.96                        |

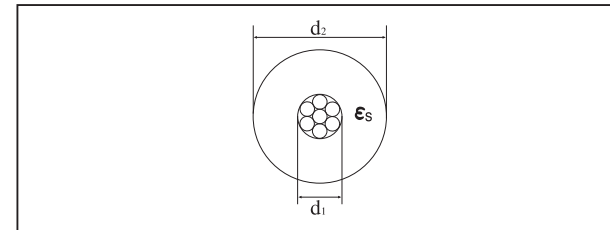
### 2. Insulation Resistance

$$R = \frac{3.665}{l} \cdot \rho \cdot \log_{10} \frac{D}{d} \times 10^{-6} (M\Omega)$$

$R$  : Insulation Resistance ( $M\Omega$ )  
 $\rho$  : Volume Resistivity of Insulator ( $\Omega/\text{mm}$ )  
 $d$  : Outer Diameter of Conductor (mm)  
 $D$  : Outer Diameter of Insulation (mm)  
 $l$  : Wire Length (cm)

### 3. Capacitance

#### 1) Coaxial Cable

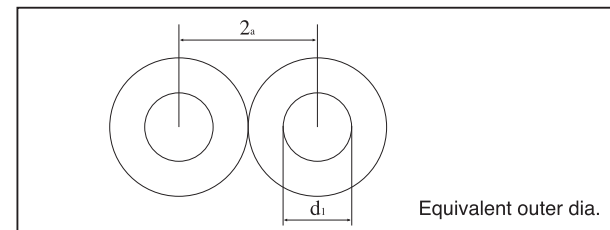


$C$  : Capacitance (nF/km)  
 $d_o$  : Wire diameter of inner conductor (mm)  
 $d_{oo}$  : Inner diameter of outer conductor (mm)  
 $d_w$  : Braided wire diameter (mm)  
 $\epsilon$  : Effective dielectric constant  
 $d_1$  : Equivalent outer diameter of inner conductor (mm)  
 $\epsilon = d_o \times k \times k$   
 (k : Multiplier of stranded wire outer diameter,  
 k : Equivalent outer diameter coefficient)  
 $d_2$  : Outer conductor equivalent inner diameter =  $d_{oo} + 1.5d_w$

| Number of Stranded Conductors | k    | k    |
|-------------------------------|------|------|
| 1                             | 1.0  | 1.0  |
| 7                             | 0.94 | 3.0  |
| 12                            | 0.96 | 4.15 |
| 19                            | 0.97 | 5.0  |

$$C = \frac{10^3 \epsilon}{18 l n \frac{d_2}{d_1}} = \frac{24.12 \epsilon}{\log_{10} \frac{d_2}{d_1}} (\text{nF/km})$$

#### 2) Twisted Pair Wires



$2a$  : Distance between conductor centers (mm)  
 $\epsilon_s$  : Specific Dielectric Constant of Insulation  
 $C = \frac{\pi \epsilon}{l n \frac{2a + \sqrt{(2a)^2 - (d_1)^2}}{d_1}} = \frac{12.08 \epsilon_s}{\log_{10} \frac{2a + \sqrt{(2a)^2 - (kd_1)^2}}{d_1}} (\text{F/m})$

## Electrical Characteristics Calculation Formulations

#### 3) Shielded pair (Multipair cable)

$$C \approx \frac{27.8 \epsilon}{l n \frac{0.94 D}{d_1}} (\text{nF/km})$$

$\epsilon$  : Effective dielectric constants  
 $D$  : Outer diameter of a pair

### 4. Cable Constant Calculation Formulas (Sine Wave AC)

Symbols :

$R$  : Return Resistance ( $\Omega/\text{loop.km}$ )  
 $L$  : Inductance (H/km)  
 $C$  : Capacitance (F/km)  
 $G$  : Conductance ( $\Omega/\text{km}$ )  
 $f$  : Frequency (Hz)  
 $\omega$  : Angular Frequency ( $= 2\pi f$ )  
 $\alpha$  : Attenuation (Np/km) (INp = 8.686dB)  
 $\beta$  : Phase (rad/km)  
 $\gamma$  : Propagation Constant  $\gamma = \alpha + j\beta$   
 $Z_o$  : Characteristic Impedance ( $\Omega$ )

#### 1) Basic Secondary Constant Formulas

• Propagation Constant  
 $\gamma = \sqrt{(R + j\omega L)(G + j\omega C)} = \alpha + j\beta$   
 • Characteristic Impedance  
 $\alpha = \sqrt{\frac{1}{2} \{ \sqrt{(R^2 + \omega^2 L^2)(G^2 + \omega^2 C^2)} + (RG - \omega^2 LC) \}}$   
 $\beta = \sqrt{\frac{1}{2} \{ \sqrt{(R^2 + \omega^2 L^2)(G^2 + \omega^2 C^2)} - (RG - \omega^2 LC) \}}$   
 • Attenuation Phase  
 $Z_o = \frac{\sqrt{R + j\omega L}}{G + j\omega C} = |Z_o| e^{j\theta} (\theta: \text{rad})$

#### 2) Secondary Constant Approximation Formulas

• For DC, since  $\omega = 0$  :  
 $\alpha = \sqrt{RG} \quad \beta = 0 \quad |Z| = \sqrt{\frac{R}{G}}$   
 • For very low frequencies (at the most up to commercial frequencies) since ( $\omega \approx 0, \omega L \ll R, \omega C \ll G$ ).  
 $\alpha \approx \sqrt{RG} \quad \beta \approx \omega \left( \frac{L}{2\sqrt{R}} + \frac{C}{2\sqrt{G}} \right) \quad |Z_o| \approx \sqrt{\frac{R}{G}} \quad \theta \approx \frac{L}{2} \left( \frac{\omega L}{R} - \frac{\omega C}{G} \right)$   
 • For low frequencies (audio frequencies) since ( $\omega L \ll R, \omega C \gg G, LG \ll RC$ ).  
 $\alpha \approx \beta \approx \sqrt{\frac{\omega CR}{2}} \quad |Z_o| = \sqrt{\frac{R}{j\omega C}} = \sqrt{\frac{R}{2\omega C}} - j\sqrt{\frac{R}{2\omega C}}$

• For high frequencies (higher than about several tens of kHz)  
 since ( $\omega L \gg R, \omega C \gg G$ ).

$$\alpha \approx \left( \frac{R}{2\sqrt{L}} + \frac{G}{2\sqrt{C}} \right) \quad \beta \approx \omega \sqrt{LC}$$

(ii) Characteristic Impedance

$$Z_o \approx \sqrt{\frac{L}{C}}$$

### 5. Coaxial Cable Constant Calculation Formulas

Symbols :

$d_1$  : Equivalent outer diameter of inner conductor (m)  
 $d_2$  : Equivalent inner diameter of outer conductor (m)  
 $t_1$  : Thickness of inner conductor (m)  
 $t_2$  : Thickness of outer conductor (m)  
 $\epsilon$  : Effective dielectric constant of insulation ( $\epsilon_s \epsilon_o$ )  
 $\epsilon_s$  : Effective specified dielectric constant of insulation  
 $\epsilon_o$  : Dielectric constant in vacuum  
 $\mu$  : Effective permeability of insulation  
 $\mu_o$  : Permeability in vacuum  
 $\mu_1$  : Permeability of inner conductor (H/m)  
 $\mu_2$  : Permeability of outer conductor (H/m)  
 $\rho_o$  : Resistivity of stranded annealed copper  
 $\rho_1$  : Resistivity of inner conductor (m)  
 $\rho_2$  : Resistivity of outer conductor (m)  
 $\tan \delta$  : Effective insulator dielectric power factor  
 $R$  : Effective conductor resistance ( $\Omega/\text{m}$ )  
 $R_1$  : Effective resistance of inner conductor  
 (outer surface resistance)( $\Omega/\text{m}$ )  
 $R_2$  : Effective resistance of outer conductor  
 (outer surface resistance)( $\Omega/\text{m}$ )  
 $L$  : Inductance (H/m)  
 $L_1$  : Self Inductance of inner conductor  
 (outer surface inductance)(H/m)  
 $L_2$  : Self Inductance of outer conductor  
 (inner surface inductance)(H/m)  
 $L_e$  : External inductance (H/m)  
 $C$  : Capacitance (F/m)  
 $G$  : Conductance ( $\Omega/\text{m}$ )  
 $f$  : Frequency (Hz)  
 $\omega$  : Angular frequency ( $= 2\pi f$ )  
 $\alpha$  : Attenuation (Np/m) (INP=8.686 dB)  
 $\alpha_r$  : Resistive attenuation (Np/m or dB/m)  
 $\alpha_g$  : Cross talk (Np/m or dB/m)  
 $\beta$  : Phase (rad/m)  
 $\gamma$  : Propagation constant ( $= \alpha + j\beta$ )  
 $Z_o$  : Characteristic impedance ( $\Omega$ )

## Electrical Characteristics Calculation Formulations

### 1) Primary Constants of Coaxial Cables (sine wave AC)

#### ● Basic Formulae

R : Effective Conductor Resistance ( $\Omega$ /m)

$$R = R_1 + R_2 \quad R_1 = \frac{1}{d_1} \sqrt{\frac{\mu_1 \rho_1 f}{\pi}} \cdot F_R(u_1) + \frac{(d_1 + 3d_1)}{4\pi d_1^2 d_1} \cdot \rho_1$$

$$R_2 = \frac{1}{d_2} \sqrt{\frac{\mu_2 \rho_2 f}{\pi}} \cdot F_R(u_2) + \frac{(d_2 + 3d_2)}{4\pi d_2^2 d_2} \cdot \rho_2$$

Where  $d_1' = d_1 - 2t_1$ ,  $d_2' = d_2 + 2t_2$  However, since

$t_1 < d_1$  and  $d_1' \approx d_1$ ,  $d_2' \approx d_2$ , assume that

$$R_1 = \sqrt{\frac{\mu_1 \rho_1 f}{\pi}} \cdot \frac{F_R(u_1)}{d_1} + \sqrt{\frac{\mu_2 \rho_2 f}{\pi}} \cdot \frac{F_R(u_2)}{d_2} + \left( \frac{\rho_1}{\pi d_1^2} - \frac{\rho_2}{\pi d_2^2} \right)$$

L : Inductance (H/m)

L :  $L_e + L_1 + L_2$

$$L_e = \frac{\mu}{2\pi} \ln \frac{d_2}{d_1} = 0.4605 \log_{10} \frac{d_2}{d_1}$$

$$L_1 = \frac{1}{2\pi d_1} \sqrt{\frac{\mu_1 \rho_1}{\pi f}} F_L(u_1)$$

$$L_2 = \frac{1}{2\pi d_2} \sqrt{\frac{\mu_2 \rho_2}{\pi f}} F_L(u_2)$$

G : Conductance ( $\Omega$ /m)

$G = \omega C \tan \delta = 2\pi f C \tan \delta$

C : Capacitance (F/m)

$$C = \frac{2\pi\epsilon}{\ln \frac{d_2}{d_1}} = \frac{24.13 \cdot \epsilon_s}{\log_{10} \frac{d_2}{d_1}} \times 10^{-12}$$

$$\epsilon = \epsilon_s \cdot \epsilon_o$$

where

$$F_R(u_i) = \frac{\sinh u_i + \sin u_i}{\cosh u_i - \cos u_i} \quad F_R(u_i) = \frac{\sinh u_i + \sin u_i}{\cosh u_i - \cos u_i}$$

$$u_i = t_i \sqrt{\frac{2\omega\mu_i}{\rho_i}} = 2t_i \sqrt{\frac{\pi f \mu_i}{\rho_i}} = 2t_i \sqrt{\frac{\pi f \mu_i}{\rho_i}} = \frac{2t_i}{\delta_i}$$

$\sigma_i$  : Conductor conductivity (Siemens/m)

$\delta_i$  : Conductor skin thickness (m)

$i = 1, 2$  (inner and outer conductors)

#### ● Approximation Formulas for relatively high frequencies

$F_R(u_i)$ ,  $F_R(u_i) \approx 1$ , therefore,

$$R = \frac{1}{d_1} \sqrt{\frac{\mu_1 \rho_1 f}{\pi}} + \frac{1}{d_2} \sqrt{\frac{\mu_2 \rho_2 f}{\pi}} + \left( \frac{\rho_1}{\pi d_1^2} - \frac{\rho_2}{\pi d_2^2} \right)$$

$$L = \frac{\mu}{2\pi} \ln \frac{d_2}{d_1} + \frac{1}{2\pi d_1} \sqrt{\frac{\mu_1 \rho_1}{\pi f}} + \frac{1}{2\pi d_2} \sqrt{\frac{\mu_2 \rho_2}{\pi f}}$$

For higher frequencies

$$R = \frac{1}{d_1} \sqrt{\frac{\mu_1 \rho_1 f}{\pi}} + \frac{1}{d_2} \sqrt{\frac{\mu_2 \rho_2 f}{\pi}}$$

(when  $d_1$  and  $d_2$  are not much less than 1)

$$L = \frac{\mu}{2\pi} \ln \frac{d_2}{d_1}$$

When the inner and outer conductors are stranded annealed copper(non-magnetic) and the inner conductor is a solid conductor without a ferromagnetic insulator.

$$R = 83.04 \sqrt{f} \left\{ \frac{k_1}{d_1} + \frac{k_2}{d_2} F_R(u_2) \right\} \times 10^{-9} + 5.487 \left( \frac{k_1^2}{d_1^2} - \frac{k_2^2}{d_2^2} \right) \times 10^{-9}$$

$$L = 0.4605 \log_{10} \frac{d_2}{d_1} \times 10^{-6} + \frac{13.21}{\sqrt{f}} \left\{ \frac{k_1}{d_1} + \frac{k_2}{d_2} F_R(u_2) \right\} \times 10^{-9}$$

where  $\mu_1 = \mu_2 = \mu = \mu_o$  (Non-magnetic material)

$F_R(u_1) = F_R(u_1) = 1$  (Solid internal conductor)

$u_2 = 30.3 t_2 \sqrt{f}$  (for stranded annealed copper)

and  $\rho_1 = k_1^2 \rho_o$ ,  $\rho_2 = k_2^2 \rho_o$ , where  $k_i^2$  is as specified below

$k_i = 1$  (Single copper wire, Copper circular tube)

$k_i = 1.2$  (Stranded wire)

$k_i = 1.3$  (Aluminum Tube)

$k_i = 3.6$  (Lead Tube)

$k_i = 2 \sim 3$  (Braided Copper Wire)

For comparatively high frequencies

$F_R(u_2)$ ,  $F_L(u_2) \approx 1$ , therefore,

$$R = 83.04 \sqrt{f} \left\{ \frac{k_1}{d_1} + \frac{k_2}{d_2} \right\} \times 10^{-9} + 5.487 \left( \frac{k_1^2}{d_1^2} - \frac{k_2^2}{d_2^2} \right) \times 10^{-9}$$

$$L = 0.4605 \log_{10} \frac{d_2}{d_1} \times 10^{-6} + \frac{13.21}{\sqrt{f}} \left\{ \frac{k_1}{d_1} + \frac{k_2}{d_2} \right\} \times 10^{-9}$$

For higher frequencies

$$R = 83.04 \sqrt{f} \left\{ \frac{k_1}{d_1} + \frac{k_2}{d_2} \right\} \times 10^{-9}$$

( $d_1$  and  $d_2$  are not much less than 1)

$$L = 0.4605 \log_{10} \frac{d_2}{d_1} \times 10^{-6}$$

### 2) Coaxial Cable Secondary Constants (sine wave AC)

Since coaxial cables are used at comparatively high frequencies, usually  $\omega L \approx \omega L_e > R$ ,  $\omega C > G$

Accordingly,  $Z_o$  : Characteristic impedance  $\Omega$  is obtained by

$$Z_o = \sqrt{\frac{L}{C}} - j \frac{R}{2\beta}$$

$\alpha$  : Attenuation Np/m

$$\alpha = \alpha_r + \alpha_g \quad \alpha_r = \frac{R}{2\sqrt{L}} \quad \alpha_g = \frac{G}{2\sqrt{C}}$$

## Electrical Characteristics Calculation Formulations

$\beta$  : Phase rad/m

$$\beta = \omega \sqrt{LC} \left\{ 1 + \frac{1}{8} \left( \frac{R}{\omega L} + \frac{G}{\omega C} \right) \right\}$$

For frequencies of more than several tens of kHz

$$Z_o = Z_{\infty} + \Delta Z_o (1-j)$$

$$\begin{cases} Z_{\infty} = \frac{60}{\sqrt{\epsilon_s}} \ln \frac{d_2}{d_1} = \frac{138.2}{\sqrt{\epsilon_s}} \log_{10} \frac{d_2}{d_1} \\ \Delta Z_o = \frac{1.98}{\sqrt{f} \sqrt{\epsilon_s}} \left( \frac{k_1}{d_1} + \frac{k_2}{d_2} \right) \end{cases}$$

The  $\Delta Z_o$  item is negligible, if frequency  $f$  is higher than several hundred kHz

$$\begin{aligned} \alpha_r &= \frac{\sqrt{10} \sqrt{\epsilon_s} \sqrt{f}}{60 \ln \frac{d_2}{d_1}} \left( \frac{\sqrt{\rho_1}}{d_1} + \frac{\sqrt{\rho_2}}{d_2} \right) \times 10^{-4} \text{ (Np/m)} \\ &= 0.0629 \sqrt{\epsilon_s} f_m \frac{\left( \frac{\sqrt{\rho_1}}{d_1} + \frac{\sqrt{\rho_2}}{d_2} \right)}{\log_{10} \frac{d_2}{d_1}} \text{ (dB/km)} \end{aligned}$$

$\epsilon$  : Effective Dielectric Constant  $f_m$  : MHz

$$\alpha_g = \frac{\pi}{3} \cdot f \cdot \sqrt{\epsilon_s} \cdot \tan \delta \times 10^{-6} \text{ (Np/m)}$$

$$= 90.9 f_m \sqrt{\epsilon_s} \cdot \tan \delta \text{ (dB/m)}$$

$$\beta = 20.94 \cdot f \cdot \sqrt{\epsilon_s} \times 10^{-6} + \frac{0.301 \sqrt{\epsilon_s}}{\sqrt{f} \cdot \log_{10} \frac{d_2}{d_1}} \left( \frac{k_1}{d_1} + \frac{k_2}{d_2} \right) \times 10^{-9}$$

#### ● Wave length reduction ratio $K = \frac{100}{\sqrt{\epsilon}}$ (%)

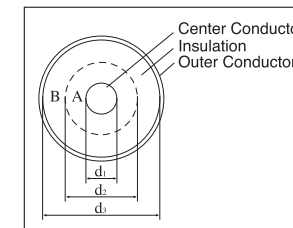
### 3) Coaxial cable composite specific dielectric constant

and composite dielectric power factor calculation formulas.

For coaxial insulation

$$\epsilon_s = \frac{\epsilon_A \epsilon_B P}{\epsilon_A R + \epsilon_B Q}$$

$$\tan \delta = \frac{\epsilon_A R \tan \delta_A + \epsilon_B Q \tan \delta_B}{\epsilon_A R + \epsilon_B Q}$$



Therefore,

$$P = \ln \frac{d_3}{d_1} \quad Q = \ln \frac{d_2}{d_1} \quad R = \ln \frac{d_3}{d_2}$$

Air-spaced insulation

For circular air-spaced insulation :

Outer diameter of inner conductor :  $d_1$

Inner diameter of outer conductor :  $d_2$

Outer diameter of air-spaced insulation  $d_3 = \frac{d_2 - d_1}{2}$

Specific dielectric constant of air-spaced insulation :  $\epsilon_c$

Dielectric power factor of air-spaced insulation :  $\tan \delta_c$

Winding pitch of air-spaced insulation :  $P$

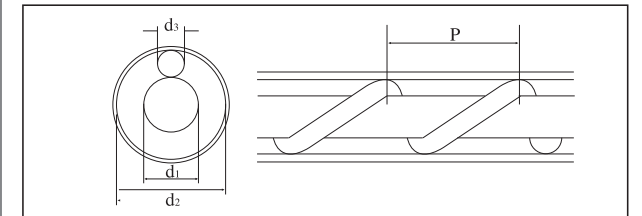
Therefore

$$\text{Air-space Occupation ratio } d_3 = \frac{d_3}{4d_4} \sqrt{1 + \left( \frac{\pi d_4}{P} \right)^2} = \frac{1}{4} \frac{d_2 + d_1}{d_2 + d_1} \sqrt{1 + \left( \frac{\pi d_4}{P} \right)^2}$$

$$\text{Where } d_4 = \frac{d_1 - d_2}{2}$$

Effective specific dielectric constant  $\epsilon_s = 1 + (\epsilon_c - 1)K$ ,

Effective dielectric power factor  $\tan \delta = \frac{\epsilon_c \cdot k \cdot \tan \delta_c}{\epsilon_s}$



## 6. Foaming Ratio and Equivalent Specific Dielectric Constant of Cellular Insulation

Effective specific dielectric constant of cellular substance :  $\epsilon_c$

Specific dielectric constant of insulator :  $\epsilon_i$

Specific dielectric constant of bubbles (air) :  $\epsilon_a$  ( $\epsilon_a = 1$ )

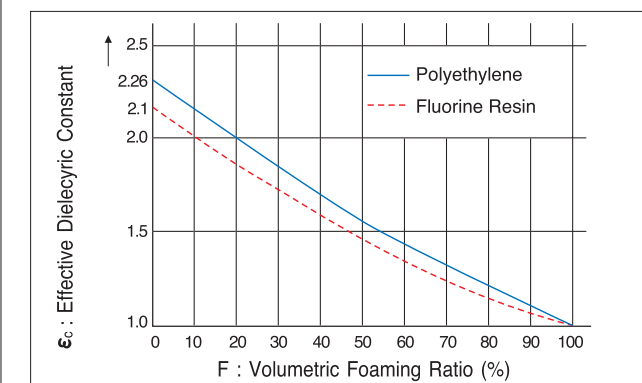
Volumetric foaming ratio :  $F$  (%)

Then,

$$\frac{\epsilon_i - \epsilon_c}{\epsilon_i - \epsilon_a} = F \cdot \frac{3\epsilon_c}{2\epsilon_c + \epsilon_a} \text{ (A.S. Windeler Formula)}$$

The effective dielectric constant of cellular polyethylene.

The relationship between the effective specific dielectric constant and the volumetric foaming ratio ( $F$ ) is shown in the following diagram when polyethylene having a specific dielectric constant  $\epsilon_i = 2.26$  is used as insulation.



Allowable Current Calculation Formulations

1. Allowable Current Calculation Formulae

$$I = K \sqrt{\frac{T_c - T_A}{\gamma \cdot R_{th}}}$$
$$\gamma = \gamma_0 \{1 + (T_c - 20)\}$$
$$R_{th} = R_1 + R_2$$
$$R_1 = \frac{P_1}{2\pi} \log_e \frac{d_2}{d_1}$$
$$R_2 = \frac{10P_1}{\pi d_2}$$

Table 1  
Specific thermal resistance of P<sub>1</sub> insulation

| Material                  | P <sub>1</sub> (°C • cm/W) |
|---------------------------|----------------------------|
| PVC                       | 600                        |
| Cross-linked PVC          | 600                        |
| Polyethylene              | 450                        |
| Cross-linked Polyethylene | 450                        |
| Silicone Rubber           | 500                        |
| Ethylene Propylene Rubber | 500                        |
| Chloroprene Rubber        | 500                        |
| Teflon (PTFE)             | 450                        |
| Teflon (FEP)              | 400                        |
| E T F E                   | 1,200                      |
| Vinylidene Fluoride       | 1,200                      |

P<sub>2</sub> surface radiation thermal resistance

| Material                     | P <sub>2</sub> (°C • cm/W)                |
|------------------------------|-------------------------------------------|
| Materials in the above table | 500+10d <sub>2</sub> (d <sub>2</sub> ≤40) |
| Impregnated braiding         | 400+20d <sub>2</sub> (d <sub>2</sub> ≤20) |

I : Allowable current (A)  
γ : Effective resistance of conductor at T<sub>c</sub> of wire (Ω/cm)  
R<sub>th</sub> : Total thermal resistance (°C cm/w)  
T<sub>c</sub> : Maximum allowable temperature of conductor (°C)  
T<sub>A</sub> : Ambient temperature (°C)  
K : Diminution rate for multi-wire installations  
γ<sub>0</sub> : Effective wire resistance at 20°C (Ω/cm)  
α : Conductor resistance temperature coefficient  
Copper 0.00393 Aluminum 0.0040  
R<sub>1</sub> : Thermal resistance of insulation (°C cm/w)  
R<sub>2</sub> : Wire surface radiation thermal resistance (°C cm/w)  
P<sub>1</sub> : Specific thermal resistance of insulation (°C cm/w)  
P<sub>2</sub> : Surface radiation specific thermal resistance (°C cm/w)  
d<sub>1</sub> : Outer diameter of conductor (mm)  
d<sub>2</sub> : Surface radiation specific thermal resistance (mm)

Table 2  
Maximum Allowable Temperature

| Material                  | T <sub>c</sub> (°C) |
|---------------------------|---------------------|
| PVC                       | 60                  |
| Heat-resistant PVC        | 75, 80, 90, 105     |
| Cross-linked PVC          | 105                 |
| Polyethylene              | 75                  |
| Cross-linked Polyethylene | 90, 105, 125        |
| T F E                     | 250                 |
| F E P                     | 200                 |
| E T F E                   | 150                 |
| Vinylidene fluoride       | 105                 |
| Silicone Rubber           | 180                 |
| Ethylene Propylene Rubber | 90                  |

Allowable Current Calculation Formulations

2. Diminution Rate (K)

Allowable current diminution rate for tightly bundled and coiled wires ; (K)

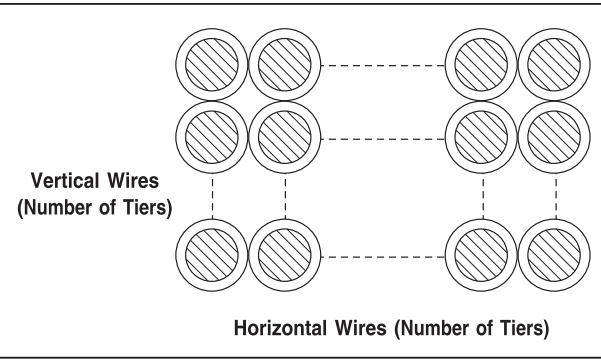
Table 3

| No. of Wires | K    |
|--------------|------|
| 1            | 1.00 |
| 2            | 0.75 |
| 3            | 0.65 |
| 4            | 0.58 |
| 5            | 0.53 |
| 6            | 0.49 |
| 7            | 0.46 |
| 8            | 0.43 |
| 9            | 0.41 |
| 10           | 0.40 |
| 11 - 15      | 0.34 |
| 16 - 20      | 0.30 |
| 21 - 30      | 0.25 |
| 31 - 40      | 0.22 |
| 41 - 50      | 0.20 |
| 51 - 60      | 0.18 |
| 61 - 70      | 0.17 |
| 71 - 100     | 0.16 |

Allowable current diminution rate for cable tray without spacing

Table 4

| No. of Horizontal Wires | Number of Rows |      |      |      |      |      |      |      |      |      |
|-------------------------|----------------|------|------|------|------|------|------|------|------|------|
|                         | 1              | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
| Number of Tiers         | 1              | 1.00 | 0.80 | 0.70 | 0.65 | 0.62 | 0.60 | 0.58 | 0.57 | 0.55 |
|                         | 2              | 0.70 | 0.56 | 0.49 | 0.45 | 0.43 | 0.42 | 0.41 | 0.40 | 0.38 |
|                         | 3              | 0.66 | 0.53 | 0.46 | 0.43 | 0.41 | 0.40 | 0.38 | 0.37 | 0.35 |
|                         | 4              | 0.58 | 0.46 | 0.41 | 0.38 | 0.36 | 0.35 | 0.34 | 0.33 | 0.31 |
|                         | 5              | 0.45 | 0.36 | 0.32 | 0.29 | 0.28 | 0.27 | 0.26 | 0.25 | 0.23 |





### Allowable Current Calculation Formulations

Table 5  
Allowable Current for TEW Wire

| Conductor  |                                   |                       | Allowable Current          |                            |                            |                            |                             |                             |                             |                             |                             |
|------------|-----------------------------------|-----------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Size (AWG) | Nominal Cross-sectional Area(mm²) | Construction (No./mm) | Conductor Temperature 60°C | Conductor Temperature 75°C | Conductor Temperature 80°C | Conductor Temperature 90°C | Conductor Temperature 105°C | Conductor Temperature 125°C | Conductor Temperature 150°C | Conductor Temperature 200°C | Conductor Temperature 260°C |
| 30         | -                                 | 1/0.26                | 1                          | 1                          | 2                          | 2                          | 2                           | 2                           | 2                           | 3                           | 3                           |
| 28         | -                                 | 1/0.32                | 1                          | 2                          | 2                          | 3                          | 3                           | 3                           | 3                           | 4                           | 4                           |
| 26         | -                                 | 1/0.40                | 2                          | 3                          | 3                          | 4                          | 4                           | 4                           | 4                           | 5                           | 6                           |
| 24         | -                                 | 1/0.50                | 3                          | 4                          | 4                          | 5                          | 5                           | 6                           | 6                           | 7                           | 8                           |
| 22         | -                                 | 1/0.65                | 5                          | 6                          | 6                          | 7                          | 8                           | 8                           | 8                           | 10                          | 12                          |
| 20         | -                                 | 1/0.80                | 6                          | 7                          | 8                          | 9                          | 10                          | 11                          | 11                          | 14                          | 15                          |
| 18         | -                                 | 1/1.0                 | 9                          | 10                         | 11                         | 12                         | 14                          | 15                          | 16                          | 19                          | 22                          |
| 16         | -                                 | 1/1.2                 | 11                         | 13                         | 15                         | 16                         | 17                          | 19                          | 22                          | 26                          | 31                          |
| 15         | -                                 | 1/1.4                 | 14                         | 16                         | 18                         | 19                         | 21                          | 23                          | 26                          | 32                          | 38                          |
| 14         | -                                 | 1/1.6                 | 17                         | 20                         | 22                         | 24                         | 27                          | 28                          | 30                          | 36                          | 42                          |
| 30         | 0.05                              | 7/0.1                 | 1                          | 1                          | 2                          | 2                          | 2                           | 2                           | 2                           | 3                           | 3                           |
| 28         | 0.08                              | 7/0.12                | 1                          | 2                          | 2                          | 3                          | 3                           | 3                           | 3                           | 4                           | 4                           |
| 26         | 0.14                              | 7/0.16                | 2                          | 3                          | 3                          | 4                          | 4                           | 5                           | 5                           | 6                           | 6                           |
| -          | 0.18                              | 7/0.18                | 3                          | 4                          | 4                          | 5                          | 5                           | 5                           | 6                           | 7                           | 8                           |
| 24         | 0.20                              | 7/0.20                | 3                          | 5                          | 5                          | 6                          | 6                           | 6                           | 8                           | 9                           | 10                          |
| 22         | 0.3                               | 12/0.18               | 4                          | 5                          | 6                          | 7                          | 8                           | 8                           | 9                           | 10                          | 11                          |
| 20         | 0.5                               | 19/0.18               | 7                          | 7                          | 8                          | 9                          | 10                          | 11                          | 11                          | 14                          | 15                          |
| -          | 0.75                              | 30/0.18               | 9                          | 10                         | 11                         | 12                         | 14                          | 15                          | 16                          | 20                          | 22                          |
| 18         | 0.9                               | 37/0.18               | 10                         | 11                         | 13                         | 14                         | 16                          | 17                          | 19                          | 23                          | 26                          |
| 16         | 1.25                              | 50/0.18               | 12                         | 14                         | 16                         | 17                         | 19                          | 21                          | 22                          | 27                          | 30                          |
| 14         | 2                                 | 37/0.26               | 17                         | 20                         | 23                         | 24                         | 27                          | 28                          | 30                          | 37                          | 41                          |
| -          | 3.5                               | 45/0.32               | 23                         | 27                         | 32                         | 33                         | 35                          | 44                          | 45                          | 56                          | 62                          |
| -          | 5.5                               | 70/0.32               | 32                         | 38                         | 44                         | 45                         | 48                          | 59                          | 62                          | 77                          | 86                          |

Table 6  
Conductor Temperatures are the same as Table 5

| Current Correction Factor at Ambient Temperature | 30°C                                          | 1.22                       | 1.13                       | 1.11                       | 1.09                       | 1.07                        | 1.05                        | 1.04                         | 1.03                         | 1.02                         |
|--------------------------------------------------|-----------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|
|                                                  | 40°C                                          | 1.00                       | 1.00                       | 1.00                       | 1.00                       | 1.00                        | 1.00                        | 1.00                         | 1.00                         | 1.00                         |
|                                                  | 50°C                                          | 0.70                       | 0.84                       | 0.86                       | 0.89                       | 0.91                        | 0.93                        | 0.95                         | 0.96                         | 0.97                         |
|                                                  | 60°C                                          | -                          | 0.65                       | 0.70                       | 0.77                       | 0.83                        | 0.87                        | 0.90                         | 0.93                         | 0.95                         |
|                                                  | 70°C                                          | -                          | 0.37                       | 0.50                       | 0.63                       | 0.73                        | 0.80                        | 0.85                         | 0.90                         | 0.92                         |
|                                                  | 80°C                                          | -                          | -                          | -                          | 0.44                       | 0.62                        | 0.72                        | 0.79                         | 0.86                         | 0.90                         |
|                                                  | 90°C                                          | -                          | -                          | -                          | -                          | 0.48                        | 0.64                        | 0.73                         | 0.82                         | 0.87                         |
|                                                  | 100°C                                         | -                          | -                          | -                          | -                          | 0.27                        | 0.54                        | 0.57                         | 0.79                         | 0.85                         |
|                                                  | 125°C                                         | -                          | -                          | -                          | -                          | -                           | -                           | 0.47                         | 0.68                         | 0.78                         |
|                                                  | 150°C                                         | -                          | -                          | -                          | -                          | -                           | -                           | -                            | 0.55                         | 0.70                         |
|                                                  | 200°C                                         | -                          | -                          | -                          | -                          | -                           | -                           | -                            | -                            | 0.52                         |
|                                                  | Current Correction Factor Calculation Formula | $\sqrt{\frac{60-T_A}{20}}$ | $\sqrt{\frac{75-T_A}{35}}$ | $\sqrt{\frac{80-T_A}{40}}$ | $\sqrt{\frac{90-T_A}{50}}$ | $\sqrt{\frac{105-T_A}{65}}$ | $\sqrt{\frac{125-T_A}{85}}$ | $\sqrt{\frac{150-T_A}{110}}$ | $\sqrt{\frac{200-T_A}{160}}$ | $\sqrt{\frac{260-T_A}{220}}$ |

### AWG ⇔ mm Conversion Table of Wire Gauges

| Gauge  |        |        |       | Diameter |       | Cross-sectional Area |         |       | Copper Wire Weight (kg/km) |
|--------|--------|--------|-------|----------|-------|----------------------|---------|-------|----------------------------|
| B.W.G. | A.W.G. | S.W.G. | mm.G. | (mil)    | (mm)  | (CM)                 | (sq.in) | (mm²) |                            |
| 5/0    | ...    | 7/0    | ...   | 500.0    | 12.70 | 250,000              | .1964   | 126.7 | 1,126                      |
| ...    | ...    | ...    | 12    | 472.4    | 12.00 | 223,162              | .1753   | 113.1 | 1,005                      |
| ...    | ...    | 6/0    | ...   | 464.0    | 11.79 | 215,296              | .1691   | 109.1 | 969.0                      |
| ...    | 4/0    | ...    | ...   | 460.0    | 11.68 | 211,600              | .1662   | 107.2 | 953.0                      |
| 4/0    | ...    | ...    | ...   | 454.0    | 11.53 | 206,100              | .1619   | 104.4 | 928.1                      |
| ...    | ...    | 5/0    | ...   | 432.0    | 10.97 | 186,624              | .1466   | 94.56 | 840.6                      |
| 3/0    | ...    | ...    | ...   | 425.0    | 10.80 | 180,600              | .1419   | 91.52 | 813.6                      |
| ...    | 3/0    | ...    | ...   | 409.6    | 10.40 | 167,772              | .1318   | 85.03 | 755.9                      |
| ...    | ...    | 4/0    | ...   | 400.0    | 10.16 | 160,000              | .1257   | 81.07 | 720.7                      |
| ...    | ...    | ...    | 10    | 393.7    | 10.00 | 155,000              | .1217   | 78.54 | 698.2                      |
| 2/0    | ...    | ...    | ...   | 380.0    | 9.652 | 144,400              | .1134   | 73.17 | 650.5                      |
| ...    | ...    | 3/0    | ...   | 372.0    | 9.449 | 138,384              | .1087   | 70.12 | 623.4                      |
| ...    | 2/0    | ...    | ...   | 364.8    | 9.266 | 133,079              | .1045   | 67.42 | 599.4                      |
| ...    | ...    | ...    | 9     | 354.3    | 9.000 | 125,528              | .09859  | 63.62 | 565.6                      |
| ...    | ...    | 2/0    | ...   | 348.0    | 8.839 | 121,104              | .09512  | 61.36 | 545.5                      |
| 0      | ...    | ...    | ...   | 340.0    | 8.636 | 115,600              | .09079  | 58.58 | 520.8                      |
| ...    | 0      | ...    | ...   | 324.9    | 8.254 | 105,560              | .08291  | 53.49 | 475.5                      |
| ...    | ...    | 0      | ...   | 324.0    | 8.230 | 104,976              | .08245  | 53.19 | 472.8                      |
| ...    | ...    | ...    | 8     | 315.0    | 8.000 | 99,225               | .07793  | 50.27 | 446.9                      |
| 1      | ...    | 1      | ...   | 300.0    | 7.620 | 90,000               | .07069  | 45.60 | 405.4                      |
| ...    | 1      | ...    | ...   | 289.3    | 7.343 | 83,694               | .06573  | 42.41 | 377.0                      |
| 2      | ...    | ...    | ...   | 284.0    | 7.214 | 80,660               | .06335  | 40.87 | 363.0                      |
| ...    | ...    | 2      | ...   | 276.0    | 7.010 | 76,176               | .05983  | 38.60 | 343.0                      |
| ...    | ...    | ...    | 7     | 275.6    | 7.000 | 75,955               | .05966  | 38.48 | 342.1                      |
| 3      | ...    | ...    | ...   | 259.0    | 6.579 | 67,080               | .05269  | 33.99 | 302.0                      |
| ...    | 2      | ...    | ...   | 257.6    | 6.544 | 66,358               | .05212  | 33.63 | 299.0                      |
| ...    | ...    | ...    | 6.5   | 255.9    | 6.500 | 65,485               | .05143  | 33.18 | 295.0                      |
| ...    | ...    | 3      | ...   | 252.0    | 6.401 | 63,504               | .04988  | 32.18 | 286.1                      |
| 4      | ...    | ...    | ...   | 238.0    | 6.045 | 56,640               | .04449  | 28.70 | 255.1                      |
| ...    | ...    | ...    | 6.0   | 236.2    | 6.000 | 55,790               | .04382  | 28.27 | 251.2                      |
| ...    | ...    | 4      | ...   | 232.0    | 5.893 | 53,824               | .04227  | 27.27 | 242.4                      |
| ...    | 3      | ...    | ...   | 229.4    | 5.827 | 52,624               | .04133  | 26.66 | 237.0                      |
| 5      | ...    | ...    | ...   | 220.0    | 5.588 | 48,400               | .03801  | 24.52 | 218.0                      |
| ...    | ...    | ...    | 5.5   | 216.5    | 5.500 | 46,872               | .03681  | 23.72 | 210.9                      |
| ...    | ...    | 5      | ...   | 212.0    | 5.385 | 44,944               | .03530  | 22.77 | 202.4                      |
| ...    | 4      | ...    | ...   | 204.3    | 5.189 | 41,738               | .03278  | 21.15 | 188.0                      |
| 6      | ...    | ...    | ...   | 203.0    | 5.156 | 41,210               | .03237  | 20.88 | 185.6                      |
| ...    | ...    | ...    | 5.0   | 196.9    | 5.000 | 38,770               | .03045  | 19.63 | 174.5                      |
| ...    | ...    | 6      | ...   | 192.0    | 4.877 | 36,864               | .02895  | 18.68 | 166.2                      |
| ...    | 5      | ...    | ...   | 181.9    | 4.621 | 33,088               | .02599  | 16.77 | 149.1                      |
| 7      | ...    | ...    | ...   | 180.0    | 4.572 | 32,400               | .02545  | 16.42 | 146.0                      |
| ...    | ...    | ...    | 4.5   | 177.2    | 4.500 | 31,400               | .02466  | 15.90 | 141.4                      |
| ...    | ...    | 7      | ...   | 176.0    | 4.470 | 30,976               | .02433  | 15.70 | 139.6                      |
| 8      | ...    | ...    | ...   | 165.0    | 4.191 | 27,220               | .02138  | 13.80 | 122.7                      |
| ...    | 6      | ...    | ...   | 162.0    | 4.115 | 26,244               | .02061  | 13.30 | 118.2                      |
| ...    | ...    | 8      | ...   | 160.0    | 4.064 | 25,600               | .02011  | 12.97 | 115.3                      |
| ...    | ...    | ...    | 4.0   | 157.5    | 4.000 | 24,806               | .01948  | 12.57 | 111.8                      |
| 9      | ...    | ...    | ...   | 148.0    | 3.759 | 21,900               | .01720  | 11.10 | 98.68                      |
| ...    | 7      | ...    | ...   | 144.3    | 3.665 | 20,822               | .01635  | 10.55 | 93.79                      |
| ...    | ...    | 9      | ...   | 144.0    | 3.658 | 20,736               | .01620  | 10.52 | 93.52                      |
| ...    | ...    | ...    | 3.5   | 137.8    | 3.500 | 18,989               | .01491  | 9.621 | 85.53                      |
| 10     | ...    | ...    | ...   | 134.0    | 3.404 | 17,920               | .01410  | 9.098 | 80.88                      |
| ...    | 8      | ...    | ...   | 128.5    | 3.264 | 16,512               | .01297  | 8.368 | 74.39                      |
| ...    | ...    | 10     | ...   | 128.0    | 3.251 | 16,384               | .01287  | 8.302 | 73.81                      |
| ...    | ...    | ...    | 3.2   | 126.0    | 3.200 | 15,876               | .01247  | 8.042 | 71.49                      |
| 11     | ...    | ...    | ...   | 120.0    | 3.048 | 14,400               | .01131  | 7.297 | 64.87                      |
| ...    | ...    | 11     | ...   | 116.0    | 2.946 | 13,456               | .01057  | 6.818 | 60.61                      |
| ...    | 9      | ...    | ...   | 114.4    | 2.906 | 13,087               | .01028  | 6.632 | 58.96                      |
| ...    | ...    | ...    | 2.9   | 114.2    | 2.900 | 13,042               | .01024  | 6.605 | 58.72                      |
| 12     | ...    | ...    | ...   | 109.0    | 2.769 | 11,880               | .009331 | 6.020 | 53.52                      |

AWG ⇔ mm Conversion Table of Wire Gauges

The Following tables compare the main wire gauges used around the world. B.W.G. is an abbreviation for Birmingham (Stub's) Iron Wire Gauge A.W.G. stands for American Wire Gauge (also called Brown & Sharpe Wire Gauge). S.W.G. is abbreviation for British Standard Wire Gauge. "mm.G." represents the millimetric gauge selected by the Wire Standard Survey Subcommittee of the Japan Electric Industrial Committee in November 1921.

| Gauge  |        |        |       | Diameter |        | Cross-sectional Area |          |         | Copper Wire Weight (kg/km) |
|--------|--------|--------|-------|----------|--------|----------------------|----------|---------|----------------------------|
| B.W.G. | A.W.G. | S.W.G. | mm.G. | (mil)    | (mm)   | (CM)                 | (sq.in)  | (mm²)   |                            |
| ...    | ...    | 12     | ...   | 104.0    | 2.642  | 10.816               | .008495  | 5.481   | 48.73                      |
| ...    | ...    | ...    | 2.6   | 102.4    | 2.600  | 10.486               | .008246  | 5.309   | 47.29                      |
| ...    | 10     | ...    | ...   | 101.9    | 2.588  | 10.384               | .008156  | 5.262   | 46.78                      |
| 13     | ...    | ...    | ...   | 95.00    | 2.413  | 9.025                | .007088  | 4.573   | 40.65                      |
| ...    | ...    | 13     | ...   | 92.00    | 2.337  | 8.464                | .006648  | 4.289   | 38.13                      |
| ...    | 11     | ...    | ...   | 90.74    | 2.305  | 8.234                | .006467  | 4.172   | 37.09                      |
| ...    | ...    | ...    | 2.3   | 90.55    | 2.300  | 8.199                | .006439  | 4.155   | 36.94                      |
| 14     | ...    | ...    | ...   | 83.00    | 2.108  | 6.889                | .005411  | 3.491   | 31.04                      |
| ...    | 12     | ...    | ...   | 80.81    | 2.053  | 6.530                | .005129  | 3.309   | 29.42                      |
| ...    | ...    | 14     | ...   | 80.00    | 2.032  | 6.400                | .005027  | 3.243   | 28.83                      |
| ...    | ...    | ...    | 2.0   | 78.74    | 2.000  | 6.200                | .004869  | 3.142   | 27.93                      |
| 15     | ...    | 15     | ...   | 72.00    | 1.829  | 5.184                | .004072  | 2.627   | 23.35                      |
| ...    | 13     | ...    | ...   | 71.96    | 1.828  | 5.178                | .004067  | 2.625   | 23.33                      |
| ...    | ...    | ...    | 1.8   | 70.87    | 1.800  | 5.023                | .003945  | 2.545   | 22.63                      |
| 16     | ...    | ...    | ...   | 65.00    | 1.651  | 4.225                | .003318  | 2.141   | 19.03                      |
| ...    | 14     | ...    | ...   | 64.08    | 1.628  | 4.106                | .003225  | 2.081   | 18.50                      |
| ...    | ...    | 16     | ...   | 64.00    | 1.626  | 4.096                | .003217  | 2.075   | 18.45                      |
| ...    | ...    | ...    | 1.6   | 62.99    | 1.600  | 3.968                | .003116  | 2.011   | 17.88                      |
| 17     | ...    | ...    | ...   | 58.00    | 1.473  | 3.364                | .002642  | 1.705   | 15.16                      |
| ...    | 15     | ...    | ...   | 57.07    | 1.450  | 3.257                | .002558  | 1.650   | 14.67                      |
| ...    | ...    | 17     | ...   | 56.00    | 1.422  | 3.136                | .002463  | 1.589   | 14.13                      |
| ...    | ...    | ...    | 1.4   | 55.12    | 1.400  | 3.038                | .002386  | 1.539   | 13.68                      |
| ...    | 16     | ...    | ...   | 50.82    | 1.291  | 2.583                | .002029  | 1.309   | 11.64                      |
| 18     | ...    | ...    | ...   | 49.00    | 1.245  | 2.401                | .001886  | 1.217   | 10.82                      |
| ...    | ...    | 18     | ...   | 48.00    | 1.219  | 2.304                | .001810  | 1.167   | 10.38                      |
| ...    | ...    | ...    | 1.2   | 47.24    | 1.200  | 2.232                | .001753  | 1.131   | 10.06                      |
| ...    | 17     | ...    | ...   | 45.26    | 1.150  | 2.048                | .001608  | 1.037   | 9.219                      |
| 19     | ...    | ...    | ...   | 42.00    | 1.067  | 1.764                | .001385  | 0.8938  | 7.946                      |
| ...    | 18     | ...    | ...   | 40.30    | 1.024  | 1.624                | .001275  | 0.8226  | 7.313                      |
| ...    | ...    | 19     | ...   | 40.00    | 1.016  | 1.600                | .001257  | 0.8107  | 7.207                      |
| ...    | ...    | ...    | 1.0   | 39.37    | 1.000  | 1.550                | .001217  | 0.7854  | 6.982                      |
| ...    | ...    | 20     | ...   | 36.00    | 0.9144 | 1.296                | .001018  | 0.6567  | 5.836                      |
| ...    | 19     | ...    | ...   | 35.89    | 0.9116 | 1.288                | .001012  | 0.6529  | 5.804                      |
| ...    | ...    | ...    | 0.90  | 35.43    | 0.9000 | 1.255                | .0009857 | 0.6362  | 5.656                      |
| 20     | ...    | ...    | ...   | 35.00    | 0.8890 | 1.225                | .0009621 | 0.6207  | 5.518                      |
| 21     | ...    | 21     | ...   | 32.00    | 0.8128 | 1.024                | .0008042 | 0.5189  | 4.613                      |
| ...    | 20     | ...    | ...   | 31.96    | 0.8118 | 1.021                | .0008019 | 0.5174  | 4.600                      |
| ...    | ...    | ...    | 0.80  | 31.50    | 0.8000 | 992.3                | .0007794 | 0.5027  | 4.469                      |
| ...    | 21     | ...    | ...   | 28.46    | 0.7229 | 810.0                | .0006362 | 0.4105  | 3.649                      |
| 22     | ...    | 22     | ...   | 28.00    | 0.7112 | 784.0                | .0006158 | 0.3973  | 3.532                      |
| ...    | ...    | ...    | 0.70  | 27.56    | 0.7000 | 759.6                | .0005966 | 0.3848  | 3.421                      |
| ...    | ...    | ...    | 0.65  | 25.59    | 0.6500 | 654.8                | .0005143 | 0.3318  | 2.950                      |
| ...    | 22     | ...    | ...   | 25.35    | 0.6438 | 642.6                | .0005047 | 0.3256  | 2.895                      |
| 23     | ...    | ...    | ...   | 25.00    | 0.6350 | 625.0                | .0004909 | 0.3167  | 2.816                      |
| ...    | ...    | 23     | ...   | 24.00    | 0.6096 | 576.0                | .0004524 | 0.2919  | 2.595                      |
| ...    | ...    | ...    | 0.60  | 23.62    | 0.6000 | 557.9                | .0004382 | 0.2827  | 2.513                      |
| ...    | 23     | ...    | ...   | 22.57    | 0.5733 | 509.4                | .0004001 | 0.2581  | 2.295                      |
| 24     | ...    | 24     | ...   | 22.00    | 0.5588 | 484.0                | .0003801 | 0.2452  | 2.180                      |
| ...    | ...    | ...    | 0.55  | 21.65    | 0.5500 | 468.7                | .0003681 | 0.2376  | 2.112                      |
| ...    | 24     | ...    | ...   | 20.10    | 0.5106 | 404.0                | .0003173 | 0.2047  | 1.820                      |
| 25     | ...    | 25     | ...   | 20.00    | 0.5080 | 400.0                | .0003142 | 0.2027  | 1.802                      |
| ...    | ...    | ...    | 0.50  | 19.69    | 0.5000 | 387.7                | .0003045 | 0.1963  | 1.745                      |
| 26     | ...    | 26     | ...   | 18.00    | 0.4572 | 324.0                | .0002545 | 0.1642  | 1.460                      |
| ...    | 25     | ...    | ...   | 17.90    | 0.4547 | 320.4                | .0002516 | 0.1623  | 1.443                      |
| ...    | ...    | ...    | 0.45  | 17.72    | 0.4500 | 314.0                | .0002466 | 0.1590  | 1.414                      |
| ...    | ...    | 27     | ...   | 16.40    | 0.4166 | 269.0                | .0002113 | 0.1363  | 1.212                      |
| 27     | ...    | ...    | ...   | 16.00    | 0.4064 | 256.0                | .0002011 | 0.1297  | 1.153                      |
| ...    | 26     | ...    | ...   | 15.94    | 0.4049 | 254.1                | .0001996 | 0.1288  | 1.145                      |
| ...    | ...    | ...    | 0.40  | 15.75    | 0.4000 | 248.1                | .0001949 | 0.1257  | 1.118                      |
| ...    | ...    | 28     | ...   | 14.80    | 0.3759 | 219.0                | .0001720 | 0.1110  | 0.9868                     |
| ...    | 27     | ...    | ...   | 14.20    | 0.3606 | 201.6                | .0001583 | 0.1021  | 0.9077                     |
| 28     | ...    | ...    | ...   | 14.00    | 0.3556 | 196.0                | .0001539 | 0.09932 | 0.8830                     |
| ...    | ...    | ...    | 0.35  | 13.78    | 0.3500 | 189.9                | .0001491 | 0.09621 | 0.8553                     |
| ...    | ...    | 29     | ...   | 13.06    | 0.3454 | 185.0                | .0001453 | 0.09372 | 0.8332                     |
| 29     | ...    | ...    | ...   | 13.00    | 0.3302 | 169.0                | .0001327 | 0.08563 | 0.7613                     |
| ...    | ...    | ...    | ...   | 12.64    | 0.3211 | 159.8                | .0001255 | 0.08097 | 0.7198                     |
| ...    | ...    | ...    | 0.32  | 12.60    | 0.3200 | 158.8                | .0001247 | 0.08042 | 0.7149                     |
| ...    | ...    | 30     | ...   | 12.40    | 0.3150 | 153.8                | .0001208 | 0.07791 | 0.6926                     |
| 30     | ...    | ...    | ...   | 12.00    | 0.3048 | 144.0                | .0001131 | 0.07297 | 0.6487                     |
| ...    | ...    | 31     | ...   | 11.60    | 0.2946 | 134.6                | .0001057 | 0.06818 | 0.6061                     |

Units Conversion Table

| Gauge  |        |        |       | Diameter |         | Cross-sectional Area |             |           | Copper Wire Weight (kg/km) |
|--------|--------|--------|-------|----------|---------|----------------------|-------------|-----------|----------------------------|
| B.W.G. | A.W.G. | S.W.G. | mm.G. | (mil)    | (mm)    | (CM)                 | (sq.in)     | (mm²)     |                            |
| ...    | ...    | ...    | 0.29  | 11.42    | 0.2900  | 130.4                | .0001024    | 0.06605   | 0.5872                     |
| ...    | 29     | ...    | ...   | 11.26    | 0.2859  | 126.8                | .00009959   | 0.06425   | 0.5712                     |
| ...    | ...    | 32     | ...   | 10.80    | 0.2743  | 116.6                | .00009158   | 0.05913   | 0.5257                     |
| ...    | ...    | ...    | 0.26  | 10.24    | 0.2600  | 104.9                | .00008239   | 0.05309   | 0.4720                     |
| ...    | 30     | ...    | ...   | 10.03    | 0.2546  | 100.6                | .00007901   | 0.05097   | 0.4531                     |
| 31     | ...    | 33     | ...   | 10.000   | 0.2540  | 100.00               | .00007854   | 0.05067   | 0.4505                     |
| ...    | ...    | 34     | ...   | 9.200    | 0.2337  | 84.64                | .00006648   | 0.04289   | 0.3813                     |
| ...    | ...    | ...    | 0.23  | 9.055    | 0.2300  | 81.99                | .00006640   | 0.04155   | 0.3694                     |
| 32     | ...    | ...    | ...   | 9.000    | 0.2286  | 81.02                | .00006362   | 0.04104   | 0.3649                     |
| ...    | 31     | ...    | ...   | 8.928    | 0.2268  | 79.71                | .00006260   | 0.04039   | 0.3591                     |
| ...    | ...    | 35     | ...   | 8.400    | 0.2134  | 70.56                | .00005542   | 0.03575   | 0.3178                     |
| 33     | ...    | ...    | ...   | 8.000    | 0.2032  | 64.00                | .00005027   | 0.03243   | 0.2883                     |
| ...    | 32     | ...    | ...   | 7.950    | 0.2019  | 63.20                | .00004964   | 0.03203   | 0.2847                     |
| ...    | ...    | ...    | 0.20  | 7.874    | 0.2000  | 62.00                | .00004869   | 0.03142   | 0.2793                     |
| ...    | ...    | 36     | ...   | 7.600    | 0.1930  | 57.67                | .00004536   | 0.02927   | 0.2602                     |
| ...    | ...    | ...    | 0.18  | 7.087    | 0.1800  | 50.23                | .00003945   | 0.02545   | 0.2263                     |
| ...    | 33     | ...    | ...   | 7.080    | 0.1798  | 50.13                | .00003939   | 0.02540   | 0.2258                     |
| 34     | ...    | ...    | ...   | 7.000    | 0.1778  | 49.00                | .00003848   | 0.02483   | 0.2207                     |
| ...    | ...    | 37     | ...   | 6.800    | 0.1727  | 46.24                | .00003632   | 0.02343   | 0.2083                     |
| ...    | 34     | ...    | ...   | 6.305    | 0.1601  | 39.75                | .00003122   | 0.02014   | 0.1790                     |
| ...    | ...    | ...    | 0.16  | 6.299    | 0.1600  | 39.68                | .00003116   | 0.02011   | 0.1788                     |
| ...    | ...    | 38     | ...   | 6.000    | 0.1524  | 36.00                | .00002827   | 0.01824   | 0.1622                     |
| ...    | 35     | ...    | ...   | 5.615    | 0.1426  | 31.53                | .00002476   | 0.01597   | 0.1427                     |
| ...    | ...    | ...    | 0.14  | 5.512    | 0.1400  | 30.38                | .00002386   | 0.01539   | 0.1368                     |
| ...    | ...    | 39     | ...   | 5.200    | 0.1321  | 27.04                | .00002124   | 0.01370   | 0.1218                     |
| 35     | 36     | ...    | ...   | 5.000    | 0.1270  | 25.00                | .00001963   | 0.01267   | 0.1126                     |
| ...    | ...    | 40     | 0.12  | 4.800    | 0.1219  | 23.04                | .00001810   | 0.01167   | 0.1037                     |
| ...    | ...    | ...    | ...   | 4.724    | 0.1200  | 22.32                | .00001753   | 0.01131   | 0.1006                     |
| ...    | 37     | ...    | ...   | 4.453    | 0.1131  | 19.83                | .00001557   | 0.01005   | 0.08934                    |
| ...    | ...    | 41     | ...   | 4.400    | 0.1118  | 19.36                | .00001521   | 0.009817  | 0.08921                    |
| 36     | ...    | 42     | ...   | 4.000    | 0.1016  | 16.00                | .00001257   | 0.008107  | 0.07207                    |
| ...    | 38     | ...    | ...   | 3.965    | 0.1007  | 15.72                | .00001235   | 0.007968  | 0.07084                    |
| ...    | ...    | ...    | ...   | 3.937    | 0.1000  | 15.50                | .00001217   | 0.007854  | 0.06982                    |
| ...    | ...    | 43     | 0.10  | 3.600    | 0.09144 | 12.96                | .00001018   | 0.006567  | 0.05838                    |
| ...    | 39     | ...    | ...   | 3.531    | 0.08969 | 12.47                | .000009794  | 0.006319  | 0.05618                    |
| ...    | ...    | 44     | ...   | 3.200    | 0.08138 | 10.24                | .000008042  | 0.005189  | 0.04613                    |
| ...    | 40     | ...    | ...   | 3.145    | 0.07937 | 9.891                | .000007768  | 0.005012  | 0.04456                    |
| ...    | 41     | 45     | ...   | 2.800    | 0.07113 | 7.842                | .000006159  | 0.003973  | 0.03532                    |
| ...    | 42     | ...    | ...   | 2.494    | 0.06334 | 6.219                | .000004884  | 0.003151  | 0.02801                    |
| ...    | ...    | 46     | ...   | 2.400    | 0.06096 | 5.760                | .000004524  | 0.002919  | 0.02595                    |
| ...    | 43     | ...    | ...   | 2.221    | 0.05541 | 4.932                | .000003873  | 0.002499  | 0.02222                    |
| ...    | ...    | 47     | ...   | 2.000    | 0.05080 | 4.000                | .000003142  | 0.002027  | 0.01802                    |
| ...    | 44     | ...    | ...   | 1.978    | 0.05023 | 3.911                | .000003072  | 0.001982  | 0.01762                    |
| ...    | ...    | ...    | 0.05  | 1.969    | 0.05000 | 3.877                | .000003045  | 0.001963  | 0.01745                    |
| ...    | 45     | ...    | ...   | 1.761    | 0.04473 | 3.102                | .000002436  | 0.001572  | 0.01398                    |
| ...    | ...    | 48     | ...   | 1.600    | 0.04064 | 2.560                | .000002011  | 0.001297  | 0.01153                    |
| ...    | 46     | ...    | ...   | 1.568    | 0.03984 | 2.460                | .000001932  | 0.001246  | 0.01108                    |
| ...    | 47     | ...    | ...   | 1.397    | 0.03547 | 1.951                | .000001532  | 0.0009884 | 0.008787                   |
| ...    | 48     | ...    | ...   | 1.244    | 0.03159 | 1.547                | .000001215  | 0.0007838 | 0.006968                   |
| ...    | ...    | 49     | ...   | 1.200    | 0.03048 | 1.440                | .000001131  | 0.0007297 | 0.006487                   |
| ...    | 49     | ...    | ...   | 1.108    | 0.02813 | 1.227                | .0000009635 | 0.0006216 | 0.005526                   |
| ...    | ...    | 50     | ...   | 1.000    | 0.02540 | 1.000                | .0000007854 | 0.0005067 | 0.004505                   |
| ...    | 50     | ...    | ...   | 0.9863   | 0.02505 | 0.9728               | .0000007641 | 0.0004929 | 0.004382                   |



## A-21 Appendix

### Units Conversion Table

#### Inch Fraction

| Fraction (inches) |       |      |     | mil   | mm     | Minutes |
|-------------------|-------|------|-----|-------|--------|---------|
| 1/64              | ...   | ...  | ... | 15.6  | 0.397  | 0.131   |
| ...               | 1/32  | ...  | ... | 31.3  | 0.794  | 0.262   |
| 3/64              | ...   | ...  | ... | 46.9  | 1.191  | 0.392   |
| ...               | ...   | 1/16 | ... | 62.5  | 1.588  | 0.524   |
| 5/64              | ...   | ...  | ... | 78.1  | 1.985  | 0.655   |
| ...               | 3/32  | ...  | ... | 93.8  | 2.381  | 0.786   |
| 7/64              | ...   | ...  | ... | 109.4 | 2.778  | 0.917   |
| ...               | ...   | ...  | 1/8 | 125.0 | 3.175  | 1.048   |
| 9/64              | ...   | ...  | ... | 140.6 | 3.572  | 1.179   |
| ...               | 5/32  | ...  | ... | 156.3 | 3.969  | 1.310   |
| 11/64             | ...   | ...  | ... | 171.9 | 4.366  | 1.441   |
| ...               | ...   | 3/16 | ... | 187.5 | 4.762  | 1.572   |
| 13/64             | ...   | ...  | ... | 203.1 | 5.159  | 1.703   |
| ...               | 7/32  | ...  | ... | 218.8 | 5.556  | 1.834   |
| 15/64             | ...   | ...  | ... | 234.4 | 5.953  | 1.964   |
| ...               | ...   | ...  | 1/4 | 250.0 | 6.350  | 2.095   |
| 17/64             | ...   | ...  | ... | 265.6 | 6.747  | 2.226   |
| ...               | 9/32  | ...  | ... | 281.3 | 7.144  | 2.357   |
| 19/64             | ...   | ...  | ... | 296.9 | 7.541  | 2.488   |
| ...               | ...   | 5/16 | ... | 312.5 | 7.937  | 2.619   |
| 21/64             | ...   | ...  | ... | 328.1 | 8.334  | 2.750   |
| ...               | 1/32  | ...  | ... | 343.8 | 8.731  | 2.881   |
| 23/64             | ...   | ...  | ... | 359.4 | 8.128  | 3.012   |
| ...               | ...   | ...  | 3/8 | 375.0 | 9.525  | 3.143   |
| 25/64             | ...   | ...  | ... | 390.6 | 9.922  | 3.274   |
| ...               | 13/32 | ...  | ... | 406.3 | 10.319 | 3.405   |
| 27/64             | ...   | ...  | ... | 421.9 | 10.716 | 3.536   |
| ...               | ...   | 7/16 | ... | 437.5 | 11.112 | 3.667   |
| 29/64             | ...   | ...  | ... | 453.1 | 11.509 | 3.798   |
| ...               | 5/32  | ...  | ... | 468.8 | 11.906 | 3.929   |
| 31/64             | ...   | ...  | ... | 484.4 | 12.303 | 4.060   |
| ...               | ...   | ...  | 1/2 | 500.0 | 12.700 | 4.191   |

#### Length

| mm                    | cm       | m        | km      | inches   | feet     | yards    | chains  | miles   | nautical miles |
|-----------------------|----------|----------|---------|----------|----------|----------|---------|---------|----------------|
| 3.03030               | .303030  | .003030  | .000003 | .119305  | .009942  | .003314  | .000150 | .000001 | .000001        |
| 30.3030               | 3.03030  | .030303  | .000030 | 1.19305  | .099421  | .033140  | .001506 | .000018 | .000016        |
| 303.030               | 30.3030  | .303030  | .000303 | 11.9305  | .994211  | .331403  | .015063 | .000188 | .000163        |
| 1,818.18              | 181.818  | 1.81818  | .001818 | 71.5832  | 5.96527  | 1.98842  | .090382 | .001129 | .000981        |
| 109.090               | 10,909.0 | 109.090  | .109090 | 4,294.99 | 357.916  | 119.305  | 5.42297 | .067784 | .058867        |
| ...                   | 392,727  | 3,927.27 | 3.92727 | 154,619  | 12,884.9 | 4,294.99 | 195.227 | 2.44033 | 2.11924        |
| 1                     | 100000   | .001000  | .000001 | .039370  | .003280  | .001093  | .000049 | .000000 | .000000        |
| 10.000                | 1        | .010000  | .000010 | .393707  | .032808  | .010936  | .000497 | .000006 | .000005        |
| 1,000.00              | 100.000  | 1        | .001000 | 39.3707  | 3.28089  | 1.09363  | .049710 | .000621 | .000539        |
| ...                   | 100.000  | 1,000.00 | 1       | 39,370.7 | 3,280.89 | 1,093.63 | 497.106 | .621382 | .539621        |
| 25.39952.53995.025399 | .000025  | 1        | 0.83333 | .027777  | .001262  | .000015  | .000013 |         |                |
| 304.79430.4794.304794 | .000304  | 12.0000  | 1       | .333333  | .015151  | .000189  | .000164 |         |                |
| 914.38391.4383.914383 | .000914  | 36.0000  | 3.00000 | 1        | .045454  | .000568  | .000494 |         |                |
| 20,116.4              | 2,011.64 | 20.1164  | 0.20116 | 792.000  | 66.0000  | 22.0000  | 1       | .012500 | .010855        |
| ...                   | 160,931  | 1,608.31 | 1.60931 | 63,360.0 | 5,280.00 | 1,760.00 | 80.0000 | 1       | .868421        |
| ...                   | 185,315  | 1,853.15 | 1.85315 | 72,960   | 6,080.00 | 2,026.66 | 92.1212 | 1.15151 | 1              |



## A-22 Appendix

### Units Conversion Table

#### Area

| sq.m     | are      | sq.km   | sq.in    | sq.ft    | sq.yd    | sq.chain | acre     | sq.mile |
|----------|----------|---------|----------|----------|----------|----------|----------|---------|
| .000918  | .000009  | .000000 | 1.42337  | .009884  | .000109  | .000002  | .000000  | .000000 |
| .091827  | .000918  | .000000 | 142.337  | .988457  | .109828  | .000226  | .000022  | .000000 |
| 3.30582  | .033058  | .000003 | 5,124.15 | 35.5844  | 3.95382  | .008169  | .000816  | .000001 |
| 99.1736  | .991736  | .000099 | 153,724  | 1,067.53 | 118.614  | .245072  | .024507  | .000038 |
| 991.736  | 9.91736  | .000991 | ...      | 10,675.3 | 1,186.14 | 2.45072  | 2.45072  | .000382 |
| 9,917.36 | 99.1736  | .009917 | ...      | 106.753  | 11,861.4 | 24.5072  | 24.5071  | .003829 |
| ...      | 154.234  | 15.4234 | ...      | ...      | ...      | 38,113.6 | 3,811.36 | 5.95525 |
| 1        | .010000  | .000001 | 1,550.05 | 10.7642  | 1.19599  | .002471  | .000247  | .000000 |
| 100.000  | 1        | .000100 | 155.055  | 1,076.42 | 119.599  | .247114  | .024711  | .000038 |
| ...      | 10,000.0 | 1       | ...      | ...      | ...      | 2,471.14 | 247.114  | .386116 |
| .000645  | .000006  | ...     | 1        | .006944  | .000771  | .000001  | .000000  | .000000 |
| .092899  | .000928  | ...     | 144.000  | 1        | .111111  | .000229  | .000022  | .000000 |
| .836097  | .008360  | .000000 | 1,296.00 | 9.00000  | 1        | .002066  | .000206  | .000000 |
| 404.671  | 4.04671  | .000404 | 627.264  | 4,356.00 | 484.000  | 1        | .100000  | .000156 |
| 4,046.71 | 40.4671  | .004046 | ...      | 43,560.0 | 4,840.00 | 10.0000  | 1        | .001562 |
| ...      | 25,898.9 | 2.58989 | ...      | ...      | ...      | 6,400.00 | 640.000  | 1       |

#### Volume

| cub.cm   | cub.m   | liters   | cub.in   | cub.ft  | cub.yd  | Eng.Gallon | U.S.Gallon |
|----------|---------|----------|----------|---------|---------|------------|------------|
| 27.8264  | .000027 | .027826  | 1.69816  | .000982 | .000036 | .006127    | .007351    |
| 27,826.4 | .027826 | 27.8265  | 1,698.16 | .932735 | .036397 | 6.12784    | 7.35137    |
| ...      | 6.01051 | 6,010.51 | 366,802  | 212.259 | 7.86114 | 1,323.61   | 1,587.99   |
| 18.0390  | .000018 | .018039  | 1.10041  | .000637 | .000023 | .003972    | .004765    |
| 180.390  | .000180 | .180390  | 11.0041  | .006370 | .000235 | .039725    | .047656    |
| 1,803.90 | .001803 | 1.80390  | 110.041  | .063707 | .002359 | .397250    | .476567    |
| 18,039.0 | .018039 | 18.0390  | 1,100.41 | .637077 | .023594 | 3.97250    | 4.76567    |
| 180.390  | .180390 | 180.390  | 11,004.1 | 6.37077 | .235954 | 39.7250    | 47.6567    |
| 1        | .000001 | .001000  | .061027  | .000035 | .000001 | .000220    | .000264    |
| ...      | 1       | 1,000.00 | 61,027.1 | 35.3165 | 1.30802 | 220.216    | 264.186    |
| 1,000.00 | .001000 | 1        | 61.0271  | .035316 | .001308 | .220216    | .264186    |
| 16.3870  | .000163 | .016387  | 1        | .000578 | .000021 | .003608    | .004329    |
| 28,316.8 | .028316 | 28.3168  | 1,728.00 | 1       | .037037 | 6.23549    | 7.43051    |
| 764,554  | .764554 | 764.554  | 46,656.0 | 27.0000 | 1       | 168.358    | 201.974    |
| 4,545.96 | .004545 | 4.54596  | 277.413  | .160372 | .005939 | 1          | 1.2010     |
| 3,785.43 | .003785 | 3.78543  | 231.00   | .133680 | .004951 | .83270     | 1          |

#### Weight

| carat    | mg       | grams    | kg       | kilo-tons | grains   | ounces   | pounds   | long-tons | short-tons |
|----------|----------|----------|----------|-----------|----------|----------|----------|-----------|------------|
| 1.87500  | 375.000  | .375000  | .000375  | .000000   | 5.78712  | .013227  | .000826  | .000000   | .000000    |
| 18.7500  | 375.000  | 3.75000  | .003750  | .000003   | 57.8712  | .132277  | .008267  | .000003   | .000004    |
| 1,875.00 | 375.000  | 375.000  | .375000  | .000375   | 5,787.12 | 13.2277  | .826732  | .000369   | .000413    |
| 18,750.0 | ...      | 3,750.00 | 3.75000  | .003750   | 57,871.2 | 132.277  | 8.26732  | .003690   | .004133    |
| 3,000.00 | 600.000  | 600.000  | .600000  | .000600   | 9,259.30 | 21.1641  | 1.32277  | .000590   | .000661    |
| 1        | 200.000  | .200000  | .000200  | ...       | 3.08640  | .007050  | .000440  | .000000   | .000000    |
| .005000  | 1        | .001000  | .000001  | ...       | .015432  | .000035  | .000002  | .000000   | .000000    |
| 5.00000  | 1,000.00 | 1        | .001000  | .000001   | 15.4320  | .035273  | .002204  | .000000   | .000001    |
| 5,000.00 | ...      | 1,000.00 | 1        | .001000   | 15,432.0 | 35.2739  | 2.20462  | .000984   | .001102    |
| ...      | ...      | ...      | 1,000.00 | 1         | ...      | 35,273.9 | 2,204.62 | .984205   | 1.10230    |
| .323994  | 64.7988  | .064798  | .000064  | ...       | 1        | .002285  | .000142  | .000000   | .000000    |
| 141.747  | 28,349.5 | 28.3495  | .028349  | .000028   | 437.500  | 1        | .062500  | .000027   | .000031    |
| 2,267.96 | 453,592  | 453.592  | .453592  | .000453   | 7,000.00 | 16.0000  | 1        | .000446   | .000500    |
| ...      | ...      | ...      | 1,016.04 | 1.01604   | ...      | 35,840.0 | 2,240.00 | 1         | 1.12000    |
| ...      | ...      | ...      | 907.178  | .907178   | ...      | 32,000.0 | 2,000.00 | .892857   | 1          |



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