

**REV.  
B**

**AS22759/88**

FEDERAL SUPPLY CLASS  
6145

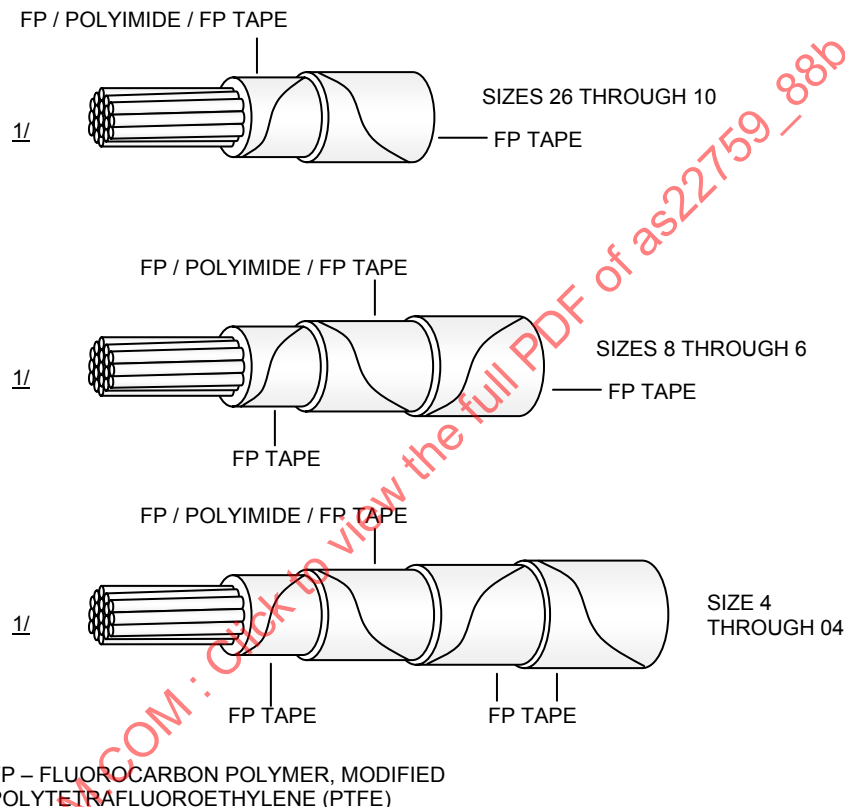
# RATIONALE

TOTAL REVISION AND UPDATE WORD-FOR-WORD MIL SPECIFICATIONS CONVERTED TO SAE STANDARDS.

# NOTICE

THE REQUIREMENTS FOR ACQUIRING THE PRODUCT DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS (DODISS) SPECIFIED IN THE SOLICITATION: AS22759.

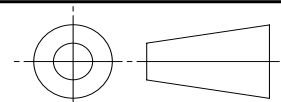
THIS SPECIFICATION IS NOT INTENDED FOR USE IN NAVAL AIRCRAFT OR NAVAL AIR SYSTEMS APPLICATIONS.



1/ STRANDED TIN COATED COPPER CONDUCTOR

FIGURE 1 - GENERAL CONFIGURATION

THIRD ANGLE PROJECTION



CUSTODIAN: SAE AE-8/AE-8D

**SAE Aerospace**  
An SAE International Group

## AEROSPACE STANDARD

(R) WIRE, ELECTRICAL, POLYTETRAFLUOROETHYLENE/  
POLYIMIDE INSULATED, NORMAL WEIGHT, TIN  
COATED, COPPER CONDUCTOR, 150 °C, 600 VOLTS

**AS22759/88**  
SHEET 1 OF 7

**REV.  
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TABLE 1 - CONSTRUCTION DETAILS

| PART NO. 1/    | WIRE SIZE | CONDUCTOR                                                           |                  |        |                                                            | FINISHED WIRE    |       |                              |        |      |
|----------------|-----------|---------------------------------------------------------------------|------------------|--------|------------------------------------------------------------|------------------|-------|------------------------------|--------|------|
|                |           | STRANDING<br>(NUMBER OF<br>STRANDS<br>X AWG<br>GAUGE OF<br>STRANDS) | DIAMETER<br>(IN) |        | RESISTANCE<br>AT 20 °C<br>(68 °F)<br>(OHMS/1000<br>FT MAX) | DIAMETER<br>(IN) |       | WEIGHT<br>(LB/1000<br>FT) 2/ |        |      |
|                |           |                                                                     | MIN              | MAX    |                                                            | MIN              | MAX   | MIN                          | TARGET | MAX  |
| M22759/88-26-* | 26        | 19 X 38                                                             | 0.0175           | 0.0204 | 41.3                                                       | 0.033            | 0.037 | 1.29                         | 1.42   | 1.55 |
| M22759/88-24-* | 24        | 19 X 36                                                             | 0.0225           | 0.0244 | 26.2                                                       | 0.038            | 0.042 | 1.87                         | 2.04   | 2.20 |
| M22759/88-22-* | 22        | 19 X 34                                                             | 0.0285           | 0.0314 | 16.2                                                       | 0.043            | 0.047 | 2.70                         | 2.90   | 3.10 |
| M22759/88-20-* | 20        | 19 X 32                                                             | 0.0365           | 0.0394 | 9.88                                                       | 0.051            | 0.055 | 4.25                         | 4.45   | 4.65 |
| M22759/88-18-* | 18        | 19 X 30                                                             | 0.0455           | 0.0494 | 6.23                                                       | 0.061            | 0.065 | 6.35                         | 6.60   | 6.85 |
| M22759/88-16-* | 16        | 19 X 29                                                             | 0.0515           | 0.0554 | 4.81                                                       | 0.068            | 0.073 | 8.10                         | 8.40   | 8.70 |
| M22759/88-14-* | 14        | 19 X 27                                                             | 0.0645           | 0.0694 | 3.06                                                       | 0.081            | 0.086 | 12.3                         | 12.8   | 13.3 |
| M22759/88-12-* | 12        | 37 X 28                                                             | 0.0835           | 0.0894 | 2.02                                                       | 0.100            | 0.105 | 19.1                         | 19.7   | 20.2 |
| M22759/88-10-* | 10        | 37 X 26                                                             | 0.106            | 0.112  | 1.26                                                       | 0.122            | 0.127 | 30.3                         | 30.8   | 32.2 |
| M22759/88-8-*  | 8         | 133 X 29                                                            | 0.158            | 0.169  | 0.701                                                      | 0.180            | 0.188 | 54.7                         | 56.6   | 58.5 |
| M22759/88-6-*  | 6         | 133 X 27                                                            | 0.198            | 0.212  | 0.445                                                      | 0.219            | 0.229 | 84.1                         | 86.5   | 88.9 |
| M22759/88-4-*  | 4         | 133 X 25                                                            | 0.250            | 0.268  | 0.280                                                      | 0.276            | 0.288 | 136                          | 140    | 144  |
| M22759/88-2-*  | 2         | 665 X 30                                                            | 0.320            | 0.340  | 0.183                                                      | 0.344            | 0.364 | 210                          | 218    | 226  |
| M22759/88-1-*  | 1         | 817 X 30                                                            | 0.366            | 0.380  | 0.149                                                      | 0.388            | 0.408 | 274                          | 283    | 292  |
| M22759/88-01-* | 0         | 1045 X 30                                                           | 0.395            | 0.425  | 0.116                                                      | 0.420            | 0.450 | 324                          | 338    | 352  |
| M22759/88-02-* | 00        | 1330 X 30                                                           | 0.440            | 0.475  | 0.091                                                      | 0.475            | 0.505 | 410                          | 429    | 448  |
| M22759/88-03-* | 000       | 1665 X 30                                                           | 0.500            | 0.540  | 0.071                                                      | 0.530            | 0.560 | 518                          | 531    | 544  |
| M22759/88-04-* | 0000      | 2109 X 30                                                           | 0.565            | 0.605  | 0.056                                                      | 0.590            | 0.630 | 646                          | 667    | 688  |

1/ PART NUMBER: THE ASTERISKS IN THE PART NUMBER COLUMN OF TABLE 1 SHALL BE REPLACED BY COLOR CODE DESIGNATORS IN ACCORDANCE WITH MIL-STD-681. EXAMPLES: M22759/88-20-93 IS A 20 AWG WHITE WITH ORANGE STRIPE.

2/ THE ACCEPTABLE VALUE FOR THE CPK FOR THE FINISHED WIRE WEIGHT LISTED SHALL BE 1.3, USING A NORMAL (GAUSSIAN) DISTRIBUTION TO OBTAIN THOSE CPK VALUES.

TABLE 2 - WIRE INSULATION MATERIALS 1/

| TAPE CODE | THICKNESS (NOM) | MATERIAL                                   |
|-----------|-----------------|--------------------------------------------|
| 1         | 0.0020          | 0.0005 (FP)/0.0010 (POLYIMIDE)/0.0005 (FP) |
| 2         | 0.0010          | FP (SKIVED)                                |
| 3         | 0.0020          | FP (SKIVED)                                |
| 4         | 0.0020          | FP (UNSINTERED)                            |
| 5         | 0.0025          | FP (UNSINTERED)                            |
| 6         | 0.0030          | FP (UNSINTERED)                            |

1/ PHYSICAL PROPERTIES OF FP TAPES (SKIVED AND UNSINTERED) SHALL BE IN ACCORDANCE WITH AS22759 REQUIREMENTS.

TABLE 3 - PHYSICAL PROPERTIES OF FP/POLYIMIDE/FP TAPES

|                          |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|
| TENSILE STRENGTH         | 19,000 LB/IN SQ (AVERAGE MINIMUM)                                                 |
| TENSILE MODULUS          | 350,000 LB/IN SQ (AVERAGE MINIMUM)                                                |
| ELONGATION               | 40 PERCENT (AVERAGE MINIMUM)                                                      |
| DIELECTRIC STRENGTH      | 4,000 VOLTS/MIL (AVERAGE MINIMUM)                                                 |
| 0.0005 FP LAYER (BOTTOM) | DISTINGUISHABLE COLOR (NEXT TO CONDUCTOR)<br>MAY BE USED AT MANUFACTURER'S OPTION |

TABLE 4 - TAPE OVERLAP REQUIREMENTS 1/

| WIRE<br>SIZE | WRAP 1       |                    |      | WRAP 2       |                    |      | WRAP 3       |                    |      | WRAP 4       |                    |      | NOMINAL<br>WALL<br>THICKNESS<br>(MILS) |
|--------------|--------------|--------------------|------|--------------|--------------------|------|--------------|--------------------|------|--------------|--------------------|------|----------------------------------------|
|              | TAPE<br>CODE | PERCENT<br>OVERLAP |      | TAPE<br>CODE | PERCENT<br>OVERLAP |      | TAPE<br>CODE | PERCENT<br>OVERLAP |      | TAPE<br>CODE | PERCENT<br>OVERLAP |      |                                        |
|              |              | MIN                | MAX  |              | MIN                | MAX  |              | MIN                | MAX  |              | MIN                | MAX  |                                        |
| 26           | 1            | 50.5               | 54.0 | 4            | 50.5               | 54.0 |              |                    |      |              |                    |      | 7.4                                    |
| 24           | 1            | 50.5               | 54.0 | 4            | 50.5               | 54.0 |              |                    |      |              |                    |      | 7.4                                    |
| 22           | 1            | 50.5               | 54.0 | 4            | 50.5               | 54.0 |              |                    |      |              |                    |      | 7.4                                    |
| 20           | 1            | 50.5               | 54.0 | 4            | 50.5               | 54.0 |              |                    |      |              |                    |      | 7.4                                    |
| 18           | 1            | 50.5               | 54.0 | 4            | 50.5               | 54.0 |              |                    |      |              |                    |      | 7.4                                    |
| 16           | 1            | 50.5               | 54.0 | 5            | 50.5               | 54.0 |              |                    |      |              |                    |      | 8.3                                    |
| 14           | 1            | 50.5               | 54.0 | 5            | 50.5               | 54.0 |              |                    |      |              |                    |      | 8.3                                    |
| 12           | 1            | 50.5               | 54.0 | 6            | 50.5               | 54.0 |              |                    |      |              |                    |      | 9.1                                    |
| 10           | 1            | 50.5               | 54.0 | 6            | 50.5               | 54.0 |              |                    |      |              |                    |      | 9.1                                    |
| 8            | 2            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 67.0               | 71.0 |              |                    |      | 13.2                                   |
| 6            | 2            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 67.0               | 71.0 |              |                    |      | 13.2                                   |
| 4            | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |
| 2            | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |
| 1            | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |
| 1/0          | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |
| 2/0          | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |
| 3/0          | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |
| 4/0          | 3            | 20.5               | 35.0 | 1            | 50.5               | 55.0 | 6            | 50.5               | 54.0 | 6            | 50.5               | 54.0 | 16.2                                   |

1/ WRAP 1 IS INNERMOST TAPE WHICH IS IN CONTACT WITH THE CONDUCTOR. WRAPS 2, 3 AND 4 ARE PROGRESSIVELY FURTHER AWAY FROM THE CONDUCTOR CORE.

#### RATINGS:

TEMPERATURE RATING: 150 °C (302 °F) MAXIMUM CONTINUOUS CONDUCTOR TEMPERATURE.

VOLTAGE RATING: 600 VOLTS (RMS) AT SEA LEVEL.

#### ADDITIONAL REQUIREMENTS:

WET ARC PROPAGATION RESISTANCE (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH AS4373, METHOD 509. MEASURE THE DAMAGE OF THE BUNDLE ALONG THE AXIS. THE WIRE IS ACCEPTABLE IF THE FOLLOWING CRITERIA ARE MET:

1. A MINIMUM OF 67 WIRES PASS THE DIELECTRIC TEST.
2. THREE WIRES OR LESS FAIL THE DIELECTRIC TEST IN ANY ONE BUNDLE.
3. ACTUAL DAMAGE TO THE WIRE IS NOT MORE THAN 3 INCHES IN ANY TEST BUNDLE.

DRY ARC PROPAGATION RESISTANCE (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH AS4373, METHOD 508. MEASURE THE DAMAGE OF THE BUNDLE ALONG THE AXIS. THE WIRE IS ACCEPTABLE IF THE FOLLOWING CRITERIA ARE MET:

1. A MINIMUM OF 67 WIRES PASS THE DIELECTRIC TEST.
2. THREE WIRES OR LESS FAIL THE DIELECTRIC TEST IN ANY ONE BUNDLE.
3. ACTUAL DAMAGE TO THE WIRE IS NOT MORE THAN 3 INCHES IN ANY TEST BUNDLE.

BLOCKING: 200 °C ± 2 °C (392 °F ± 3.6 °F)

COLOR: WHITE IS THE PREFERRED COLOR AND SHALL BE IN ACCORDANCE WITH MIL-STD-104, CLASS 2. COLORS SHALL BE LASER MARKABLE AND MEET THE COLOR LIMITS BELOW. CONFORMITY OF COLOR SHALL NOT BE REQUIRED AFTER OVEN EXPOSURE.

#### MUNSELL COLOR LIMITS FOR UV LASER MARKABLE WIRE

| COLOR  | HUE           |       | VALUE         |     | CHROMA        |     |
|--------|---------------|-------|---------------|-----|---------------|-----|
|        | FROM          | TO    | FROM          | TO  | FROM          | TO  |
| BLACK  | 2.5N          | 2.5N  | 7             | 8.5 | N/A           | N/A |
| BLUE   | 5PB           | 7.5B  | 7             | 8   | 4             | 6   |
| GREEN  | 2.5G          | 7.5G  | 7             | 9   | 2             | 6   |
| RED    | 10RP          | 5R    | 7             | 8   | 4             | 6   |
| YELLOW | 5Y            | 10Y   | 8             | 9   | 4             | 6   |
| BROWN  | 2.5YR         | 7.5R  | 7             | 9   | 2             | 4   |
| ORANGE | 10R           | 2.5YR | 6             | 7   | 8             | 10  |
| VIOLET | 2.5P          | 7.5R  | 7             | 8   | 4             | 8   |
| GRAY   | SAME AS BLACK |       | SAME AS BLACK |     | SAME AS BLACK |     |

COLOR STRIPING OR BANDING DURABILITY: 125 CYCLES (250 STROKES), 250 GRAMS WEIGHT.

CONDUCTOR STRAND ADHESION: REQUIRED

CONTINUOUS LENGTHS: SCHEDULE B

DYNAMIC CUT-THROUGH (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH AS4373, METHOD 703. BLADE SHALL BE THE STANDARD CUTTING BLADE EXCEPT THE CUTTING EDGE RADIUS SHALL BE 0.005 INCH  $\pm$  0.001 INCH. MINIMUM AVERAGE DYNAMIC CUT-THROUGH (LB) SHALL BE AS FOLLOWS:

| WIRE SIZE | 23 °C $\pm$ 5 °C | 150 °C $\pm$ 5 °C |
|-----------|------------------|-------------------|
| 26        | 10 LB            | 8 LB              |
| 20        | 25 LB            | 20 LB             |
| 16        | 25 LB            | 20 LB             |

FLAMMABILITY: TEST IN ACCORDANCE WITH AS4373, METHOD 801.

#### REQUIREMENTS:

DURATION OF AFTER-FLAME 3 SECONDS (MAXIMUM)  
 FLAME TRAVEL 3.0 INCHES (MAXIMUM)  
 NO FLAMING OF TISSUE

FORCED HYDROLYSIS: (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY) 5000 HOURS AT 70 °C. TEST 5 UNCONDITIONED AND 5 CONDITIONED SAMPLES OF AWG SIZE 20 ONLY IN ACCORDANCE WITH SAE AS4373 METHOD 602. ALL SAMPLES MUST PASS THE DIELECTRIC TEST AS LISTED IN METHOD 602.

HIGH FREQUENCY SPARK TEST: (WHEN USED IN LIEU OF IMPULSE DIELECTRIC TEST) TEST IN ACCORDANCE WITH AS4373, METHOD 505, 5.7 KILOVOLTS (RMS). TEST 100 PERCENT OF THE WIRE.

HUMIDITY RESISTANCE: AFTER HUMIDITY EXPOSURE WIRE SHALL MEET THE REQUIREMENTS FOR INITIAL INSULATION RESISTANCE.

IDENTIFICATION OF PRODUCT: NOT REQUIRED FOR SIZE 26. COLOR CODE DESIGNATOR NOT REQUIRED.

IDENTIFICATION DURABILITY: 125 CYCLES (250 STROKES), 250 GRAMS WEIGHT.

IMMERSION (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE AS4373, METHOD 601 INCLUDING THE ADDITIONAL FLUIDS LISTED IN TABLE 5 OF THIS SPECIFICATION. USE MANDRELS AND WEIGHTS LISTED IN TABLE 6 FOR BEND TESTING. DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ. FOR TURBINE FUEL IMMERSION TEST OF AS4373, EITHER JP4 OR MIL-DTL-83133 TYPE JP-8 (NATO TYPE F-34) MAY BE USED.

TABLE 5 - FLUID TABLE

| TEST FLUID                                                                                                      | TEST TEMPERATURE<br>(°C (°F)) | IMMERSION<br>TIME (HOURS) |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------|
| A. SAE AMS 1424, ANTI-ICING AND DEICING DEFROSTING FLUID, UNDILUTED                                             | 48-50 (118-122)               | 20                        |
| B. SAE AMS 1424, ANTI-ICING AND DEICING DEFROSTING FLUID, DILUTED 60/40 (FLUID/WATER) RATIO                     | 48-50 (118-122)               | 20                        |
| C. MIL-C-43616, CLEANING COMPOUND, AIRCRAFT SURFACE, TYPE I                                                     | 48-50 (118-122)               | 20                        |
| D. ASTM D 1153, METHYL ISOBUTYL KETONE (FOR USE IN ORGANIC COATINGS)                                            | 20-25 (68-77)                 | 168                       |
| E. SAE AS1241, FIRE RESISTANT HYDRAULIC FLUID FOR AIRCRAFT                                                      | 48-50 (118-122)               | 20                        |
| F. MIL-PRF-7808, LUBRICATING OIL, AIRCRAFT TURBINE ENGINE, SYNTHETIC BASE                                       | 118-121 (244-250)             | 30                        |
| G. MIL-PRF-87937, CLEANING COMPOUND, AEROSPACE EQUIPMENT, TYPE II OR TYPE IV, UNDILUTED                         | 63-68 (145-154)               | 20                        |
| H. MIL-PRF-87937, CLEANING COMPOUND, AEROSPACE EQUIPMENT, TYPE II OR TYPE IV, DILUTED 25/75 (FLUID/WATER) RATIO | 63-68 (145-154)               | 20                        |
| I. TT-S-735, STANDARD TEST FLUIDS: HYDROCARBON, TYPE I                                                          | 20-25 (68-77)                 | 168                       |
| J. TT-S-735, STANDARD TEST FLUIDS: HYDROCARBON, TYPE II                                                         | 20-25 (68-77)                 | 168                       |
| K. TT-S-735, STANDARD TEST FLUIDS: HYDROCARBON, TYPE IV                                                         | 20-25 (68-77)                 | 168                       |
| L. DIELECTRIC-COOLANT FLUID SYNTHETIC SILICATE ESTER BASE, MONSANTO COOLANOL 25 OR APPROVED EQUIVALENT          | 20-25 (68-77)                 | 168                       |
| M. ASTM D 4814, GASOLINE, AUTOMOTIVE, COMBAT                                                                    | 20-25 (68-77)                 | 168                       |

IMPULSE DIELECTRIC TEST: 8.0 KILOVOLTS (PEAK). TEST 100 PERCENT OF THE WIRE

INSULATION RESISTANCE:

SIZES 26 THROUGH 10, 5000 MEGOHMS FOR 1000 FEET (MINIMUM)

SIZES 8 THROUGH 04, 3000 MEGOHMS FOR 1000 FEET (MINIMUM)

INSULATION STATE OF SINTER: (QUALITY CONFORMANCE INSPECTION PERFORMED ON ONE SAMPLE PER LOT) EVALUATE FP LAYERS WITH A DIFFERENTIAL SCANNING CALORIMETER PER AS4373, METHOD 813. THIS TEST IS APPLICABLE TO 10 AWG AND SMALLER WIRES. THE DIFFERENCE IN ENERGY TO MELT BETWEEN THE FIRST AND SECOND HEATS SHALL BE LESS THAN OR EQUAL TO 3 JOULES/GRAM.

LAMINATION SEALING: (GROUP II QUALITY CONFORMANCE TEST) WHEN TESTED IN ACCORDANCE WITH AS4373, METHOD 809 AT 260 °C FOR 6 HOURS, THERE SHALL BE NO EVIDENCE OF TAPE SEPARATION OR LIFTING. THREE SAMPLES PER LOT SHALL BE TESTED.

LIFE CYCLE: 500 HOURS AT 230 °C  $\pm$  2 °C (446 °F  $\pm$  3.6 °F). DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ. USE MANDRELS COATED WITH POLYTETRAFLUOROETHYLENE SUCH THAT THE DIAMETER OF THE MANDRELS, AFTER COATING, STILL CONFORM TO THE REQUIRED TEST MANDRELS DIAMETERS OF TABLE 6. AFTER OVEN EXPOSURE, LAYERS SHALL NOT SEPARATE AND OR TAPES SHALL NOT LIFT ALONG THE INSULATION OR AT THE ENDS. (DARKENING OF THE TIN COATING OF THE CONDUCTORS DUE TO THE NORMAL AIR OXIDATION SHALL NOT BE CAUSE FOR REJECTION OF THIS TEST).

LOW TEMPERATURE (COLD BEND): USE MANDRELS AND WEIGHTS SPECIFIED IN TABLE 6. CHAMBER TEMPERATURE, -65 °C  $\pm$  2 °C (-85 °F  $\pm$  3.6 °F). DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ.

SHRINKAGE: TEST AT 230 °C  $\pm$  2 °C (446 °F  $\pm$  3.6 °F). MAXIMUM CHANGE IN MEASUREMENT 26 - 10 AWG 0.091 INCH. 8 - 04 AWG 0.125 INCH.

SMOKE: 200 °C  $\pm$  5 °C (392 °F  $\pm$  9 °F); NO VISIBLE SMOKE.

SOLDERABILITY: NOT REQUIRED. THIS SLASH SHEET IS PRIMARILY INTENDED FOR CRIMP TERMINATIONS. FOR SOLDERABILITY APPLICATIONS USE THE SILVER COATED COPPER VERSION OF THIS SPECIFICATION.

STRIPPABILITY: (GROUP II QUALITY CONFORMANCE TEST) AFTER STRIPPING WITH TOOLS AS DEFINED IN AS22759 AND AS5457, NO FRAGMENTS OF ANY LAYER SHALL EXTEND MORE THAN 0.031 INCHES BEYOND THE END OF THE POLYIMIDE TAPE LAYER. THIS TEST IS APPLICABLE TO WIRE SIZES 10 AWG AND SMALLER.