

REV.
B

AS22759/86

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.

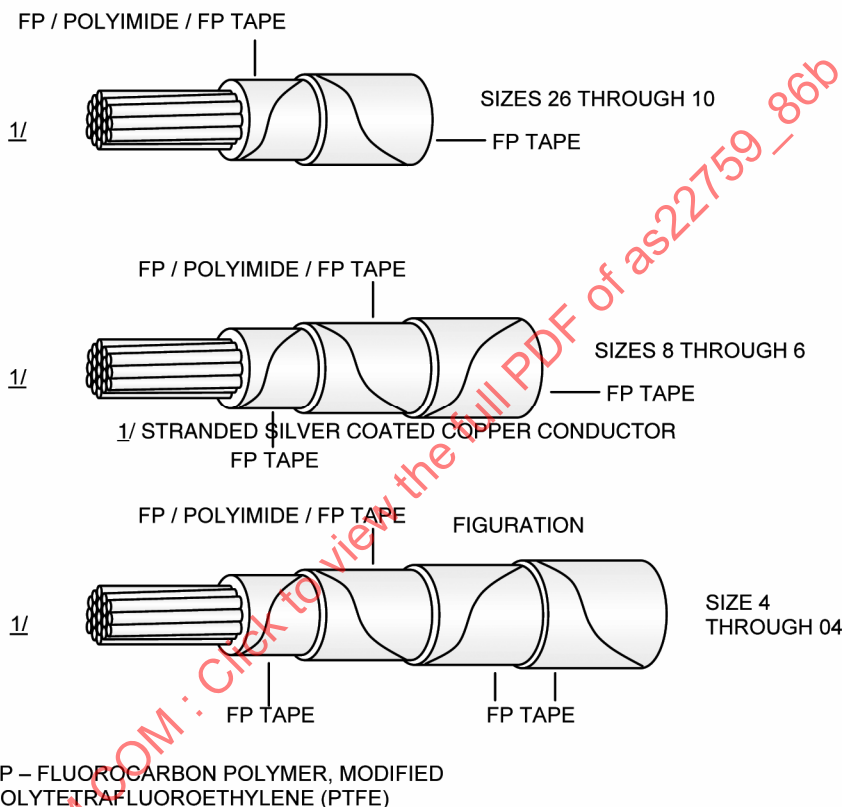
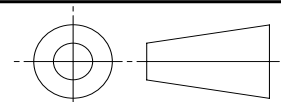


FIGURE 1

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, SILVER
COATED, COPPER CONDUCTOR, 200 °C, 600 VOLTS

AS22759/86
SHEET 1 OF 7

**REV.
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TABLE 1 - CONSTRUCTION DETAILS

PART NO. 1/	WIRE SIZE	CONDUCTOR				FINISHED WIRE				
		STRANDING (NUMBER OF STRANDS X AWG GAUGE OF STRANDS)	DIAMETER (IN)		RESISTANCE AT 20 °C (68 °F) (OHMS/1000 FT MAX)	DIAMETER (IN)		WEIGHT (LB/1000 FT) 2/		
			MIN	MAX		MIN	MAX	MIN	TARGET	MAX
M22759/86-26-*	26	19 X 38	0.0175	0.0194	38.4	0.033	0.037	1.29	1.42	1.55
M22759/86-24-*	24	19 X 36	0.0225	0.0244	24.3	0.038	0.042	1.87	2.04	2.20
M22759/86-22-*	22	19 X 34	0.0285	0.0304	15.1	0.043	0.047	2.70	2.90	3.10
M22759/86-20-*	20	19 X 32	0.0365	0.0384	9.19	0.051	0.055	4.25	4.48	4.70
M22759/86-18-*	18	19 X 30	0.0455	0.0484	5.79	0.061	0.065	6.40	6.65	6.90
M22759/86-16-*	16	19 X 29	0.0515	0.0544	4.52	0.068	0.073	8.20	8.50	8.80
M22759/86-14-*	14	19 X 27	0.0645	0.0684	2.88	0.081	0.086	12.4	12.9	13.4
M22759/86-12-*	12	37 X 28	0.0835	0.0874	1.90	0.100	0.105	18.9	19.7	20.4
M22759/86-10-*	10	37 X 26	0.106	0.110	1.19	0.122	0.127	29.3	30.8	31.6
M22759/86-8-*	8	133 X 29	0.158	0.166	0.658	0.180	0.188	54.7	56.6	58.5
M22759/86-6-*	6	133 X 27	0.198	0.208	0.418	0.219	0.229	84.1	86.5	88.9
M22759/86-4-*	4	133 X 25	0.250	0.263	0.264	0.276	0.288	136	140	144
M22759/86-2-*	2	665 X 30	0.320	0.340	0.170	0.344	0.364	210	218	226
M22759/86-1-*	1	817 X 30	0.366	0.380	0.139	0.388	0.408	274	283	292
M22759/86-01-*	0	1045 X 30	0.395	0.425	0.108	0.420	0.450	324	338	352
M22759/86-02-*	00	1330 X 30	0.440	0.475	0.085	0.475	0.505	410	429	448
M22759/86-03-*	000	1665 X 30	0.500	0.540	0.068	0.530	0.560	518	531	544
M22759/86-04-*	0000	2109 X 30	0.565	0.605	0.054	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: M22759/86-20-93 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	4000 VOLTS/MIL (AVERAGE MINIMUM)
0.0005 FP LAYER (BOTTOM)	DISTINGUISHABLE COLOR (NEXT TO CONDUCTOR) MAY BE USED AT MANUFACTURER'S OPTION

TABLE 4 - TAPE OVERLAP REQUIREMENTS 1/

WIRE SIZE	WRAP 1			WRAP 2			WRAP 3			WRAP 4			NOMINAL WALL THICKNESS (MILS)
	TAPE CODE	PERCENT OVERLAP		TAPE CODE	PERCENT OVERLAP		TAPE CODE	PERCENT OVERLAP		TAPE CODE	PERCENT 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: 200 °C (392 °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	200 °C $\pm$ 5 °C
26	10 LB	8 LB	6 LB
20	25 LB	20 LB	15 LB
16	25 LB	20 LB	15 LB

FLAMMABILITY: TEST IN ACCORDANCE WITH AS4373, METHOD 601.

REQUIREMENTS:

DURATION OF AFTER-FLAME 3 SECONDS (MAX)
 FLAME TRAVEL 3 INCHES (MAX)
 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 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 WITH 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 (°C (°F))	IMMERSION 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. 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 (MIN)
SIZES 8 THROUGH 04, 3000 MEGOHMS FOR 1000 FEET (MIN)

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.

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: REQUIRED.

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.