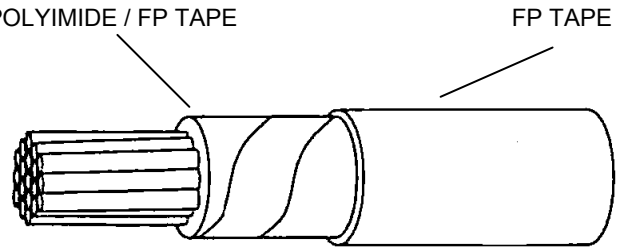
FEDERAL SUPPLY CLASS
6145

RATIONALE

THIS SPECIFICATION HAS BEEN DEVELOPED AT THE REQUEST OF NAVAL AIR SYSTEMS COMMAND AND THE UNITED STATES AIR FORCE. THIS PRODUCT IS BASED ON AS22759/89 WITH ADDITIONAL REQUIREMENTS INCLUDING A SMOOTH OUTER FLUOROPOLYMER SURFACE.

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



SIZE 26 THROUGH 20

FP – FLUOROCARBON POLYMER MODIFIED POLYTETRAFLUOROETHYLENE (PTFE)
CONDUCTOR – STRANDED SILVER COATED HIGH STRENGTH OR ULTRA HIGH STRENGTH COPPER ALLOY 1/

1/ ALLOY CONDUCTOR: THE SIZE 26 CONDUCTOR SHALL BE ULTRA-HIGH STRENGTH COPPER ALLOY. THE BREAKING STRENGTH SHALL BE 21.5 LB (MINIMUM) AND THE CONDUCTOR ELONGATION 6.0% (MINIMUM). ALL OTHER GAUGE SIZES SHALL BE HIGH STRENGTH COPPER ALLOY IN ACCORDANCE WITH AS22759.

FIGURE 1. GENERAL CONFIGURATION

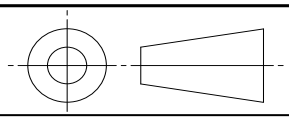
TABLE 1. CONSTRUCTION DETAILS

PART NO. 1/	WIRE SIZE	CONDUCTOR				FINISHED WIRE 3/				
		STRANDING (NUMBER OF STRANDS X AWG GUAGE 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
M22759/189-26-*	26	19 x 38	0.0175	0.0204	56.4	0.033	0.037	1.34	1.47	1.60
M22759/189-24-*	24	19 x 36	0.0225	0.0244	28.4	0.038	0.042	1.87	2.04	2.20
M22759/189-22-*	22	19 x 34	0.0285	0.0314	17.5	0.043	0.047	2.70	2.90	3.10
M22759/189-20-*	20	19 x 32	0.0365	0.0394	10.7	0.051	0.055	4.25	4.45	4.65

1/ PART NUMBER: THE ASTERISKS IN THE PART NUMBER COLUMN OF TABLE 1 SHALL BE REPLACED BY THE COLOR CODE DESIGNATORS IN ACCORDANCE WITH MIL-STD-681. M22759/189-20-93 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.
3/ THE WIRE CONSTRUCTION SHALL HAVE A SMOOTH POLYTETRAFLUOROETHYLENE (PTFE) OUTER LAYER WITH COMPLETE BONDING BETWEEN THE HOMOGENEOUS LAYERS.

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AS22759/189

THIRD ANGLE PROJECTION



ISSUED 2010-02

CUSTODIAN: AE-8 / AE-8D

PROCUREMENT SPECIFICATION:

SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

WIRE, ELECTRICAL, POLYTETRAFLUOROETHYLENE/POLYIMIDE INSULATED, SMOOTH SURFACE, NORMAL WEIGHT, SILVER-COATED HIGH STRNGTH OR ULTRA HIGH STRENGTH COPPER ALLOY, 200 ºC, 600 VOLTS

SAE AS22759/189

SHEET 1 OF 5

REV.

TABLE 2 – WIRE INSULATION MATERIAL 1/

TAPE CODE	THICKNESS (NOM)	MATERIAL
1	0.002	0.0005 (FP) / 0.0010 (Polyimide) / 0.0005 (FP)
2	0.002	FP (Unsintered)

1/ PHYSICAL PROPERTIES OF THE FP UNSINTERED TAPES 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)
DILECTRIC STRENGTH	4,000 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			NOMINAL WALL THICKNESS (MILS)
	TAPE CODE	PERCENT OVERLAP		TAPE CODE	PERCENT OVERLAP		
		MIN	MAX		MIN	MAX	
26	1	50.5	54.0	2	50.5	54.0	7.4
24	1	50.5	54.0	2	50.5	54.0	7.4
22	1	50.5	54.0	2	50.5	54.0	7.4
20	1	50.5	54.0	2	50.5	54.0	7.4

1/ WRAP 1 IS THE INNERMOST TAPE WHICH IS IN CONTACT WITH THE CONDUCTOR.

RATINGS:

TEMPERATURE RATING: 200 °C (392 °F) MAXIMUM CONTINUOUS CONDUCTOR TEMPERATURE.
VOLTAGE RATING: 600 VOLTS (RMS) AT SEA LEVEL.

ADDITIONAL REQUIREMENTS:

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 ARE MET:

1. A MINIMUM OF 70 WIRES PASS THE DIELETRIC TEST.
2. TWO WIRES OR LESS FAIL THE DIELECTRIC TEST IN ANY ONE BUNDLE.
3. ACTUAL DAMAGE TO THE WIRE IS NOT MORE THAN 1.0 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. FOR WIRE TESTING ASSOCIATED WITH QUALIFICATION, RETENTION OF QUALIFICATION AND QUALITY CONFORMANCE, CONFORMITY OF COLOR SHALL NOT BE REQUIRED AFTER OVEN EXPOSURE.

TABLE 5 - MUNSELL COLOR LIMITS FOR UV 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 BAND DURABILITY: 125 CYCLES (250 STROKES), 250 GRAM WEIGHT

CONDUCTOR STRAND ADHESION: REQUIRED

CONTINUOUS LENGTHS: SCHEDULE B

DYNAMIC CUT-THROUGH (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): BLADE SHALL BE STANDARD CUTTING BLADE EXCEPT THE CUTTING EDGE RADIUS SHALL BE 0.005 INCH ± 0.001 INCH. MINIMUM AVERAGE DYNAMIC CUT-THROUGH (LB) SHALL BE AS FOLLOWS:

WIRE SIZE	23°C ± 5°C	150°C ± 5°C	200°C ± 5°C
26	10 LB	8 LB	6 LB
20	15 LB	12 LB	10 LB

FLAMMABILITY: TEST IN ACCORDANCE WITH AS4373, METHOD 801.

REQUIREMENTS:

DURATION AFTER-FLAME	3.0 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 20 AWG WIRE.

HIGH FREQUENCY SPARK TEST: (WHEN USED IN LIEU OF THE IMPULSE DIELECTRIC TEST) 5.7 KILOVOLTS (RMS). TEST 100 PERCENT OF THE WIRE.

HUMIDITY RESISTANCE: REQUIRED. AFTER HUMIDITY EXPOSURE, THE 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 GRAM WEIGHT.

IMMERSION: (TEST REQUIRED FOR INTITAL QUALIFICATION ONLY) TEST IN ACCORDANCE WITH AS4373, METHOD 601. 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 JP-4 OR MIL-DTL-83133 TYPE JP-8 (NATO TYPE F-34) MAY BE USED.

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

INSULATION RESISTANCE: 5000 MEGOHMS PER 1000 FEET (MINIMUM)

INSULATION STATE OF SINTER: (QUALIFICATION AND QUALITY CONFORMANCE INSPECTION PERFORMED ON ONE SAMPLE PER LOT) EVALUATE FLUOROPOLYMER LAYERS ONLY. THE DIFFERENCE IN ENERGY TO MELT BETWEEN FIRST AND SECOND HEATS SHALL BE LESS THAN OR EQUAL TO 3 JOULES PER GRAM.

INSULATION STRIP FORCE: (QUALIFICATION AND GROUP II QUALITY CONFORMANCE TEST) TEST WIRE SIZES 26 THROUGH 14 ONLY. THE LENGTH OF THE INSULATION SLUG SHALL BE 0.25 INCHES. STRIP FORCE (LB) SHALL BE AS FOLLOWS. NO EVIDENCE OF INSULATION SHALL BE LEFT ON THE CONDUCTOR WHEN VIEWED WITH THE UNAIDED EYE.

WIRE SIZE	MIN FORCE	MAX FORCE
26-20	0.25 LB	6.0 LB

LAMINATION SEALING: (QUALIFICATION AND GROUP II QUALITY COMFORMANCE TEST) WHEN TESTED IN ACCORDANCE WITH AS4373, METHOD 809 AT 260 ºC ± 2 °C (500 °F ± 3.6 °F) 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 ± 2 °C (446 °F ± 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 ± 2 °C (-85 °F ± 3.6 °F). DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ.

OUTER INSULATION LAYER SURFACE SMOOTHNESS: (QUALIFICATION AND GROUP II QUALITY CONFORMANCE TEST) WHEN TESTED IN ACCORDANCE WITH AS4373, METHOD 110, THE DIFFERENCE IN WALL THICKNESS OF THE OUTER PTFE INSULATION LAYER AT THE DISCERNABLE TAPE EDGE SHALL NOT EXCEED 10.0 PERCENT.

SCRAPE ABRASION (NEEDLE): (INITIAL QUALIFICATION AND RETENTION OF QUALIFICATION) WIRE SIZE 20 ONLY. WHEN TESTED IN ACCORDANCE WITH AS4373, METHOD 301, THE AVERAGE CYCLES TO FAILURE ON 8 READINGS, AFTER DROPPING THE HIGHEST AND LOWEST VALUE OF THE 10 READINGS TESTED, SHALL NOT BE LESS THAN THE VALUES LISTED BELOW WHEN APPLYING A 1.10 LB ± 0.01 LB LOAD.

TEMPERATURE (°C (°F))	CYCLES TO FAILURE (MIN)
21-25 (67-77)	5000
68-72 (153-163)	3000
148-152 (297-307)	1000

SHRINKAGE: TEST AT 230 °C ± 2 °C (446 °F ± 3.6 °F). MAXIMUM CHANGE IN MEASUREMENT, 0.091 INCH.

SMOKE: 200 °C ± 5 °C (392 °F ± 9 °F); NO VISIBLE SMOKE.

SOLDERABILITY: REQUIRED.

STRIPPABILITY: (QUALIFICATION AND GROUP II QUALITY CONFORMANCE TEST) AFTER STRIPPING, NO FRAGMENTS OF ANY LAYER SHALL EXTEND MORE THAN 0.031 INCHES BEYOND THE END OF THE POLYIMIDE TAPE LAYER.

TAPE OVERLAP: TEST IN ACCORDANCE WITH AS4373, METHOD 109.

TENSILE MODULUS: TEST COMPOSITE FILM IN ACCORDANCE WITH ASTM D 882, METHOD A.

THERMAL INDEX: (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY). TEST WIRE SIZE 20 ONLY, 200 °C (392 °F) MINIMUM FOR 10 000 HOURS.

THERMAL SHOCK RESISTANCE: OVEN TEMPERATURE, 200 °C ± 2 °C (392 °F ± 3.6 °F). MAXIMUM CHANGE IN MEASUREMENT, 0.091 INCH, NO CRACKING.

UV LASER MARKING: (QUALIFICATION AND GROUP I QUALITY CONFORMANCE TEST) APPLICABLE TO WHITE INSULATION ONLY. TEST IN ACCORDANCE WITH AS4373, METHOD 1001. CONTRAST SHALL BE A 62 PERCENT MINIMUM AVERAGE ON SIX READINGS.

UV LASER CONTRAST AFTER THERMAL AGING: (INITIAL QUALIFICATION AND RETENTION OF QUALIFICATION) WIRE SIZE 20 ONLY. PREPARE SAMPLE IN ACCORDANCE WITH AS4373 METHOD 1001. PLACE SAMPLE IN AN AIR CIRCULATING OVEN AT 230 °C ± 2 °C (446 °F ± 3.6 °F) FOR 168 HOURS. MINIMUM AVERAGE CONTRAST AFTER AGING SHALL NOT BE LESS THAN 40 PERCENT.

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 ARE MET:

1. A MINIMUM OF 70 WIRES PASS THE DIELETRIC TEST.
2. TWO WIRES OR LESS FAIL THE DIELECTRIC TEST IN ANY ONE BUNDLE.
3. ACTUAL DAMAGE TO THE WIRE IS NOT MORE THAN 1.0 INCHES IN ANY TEST BUNDLE.

WRAP (MANDREL WRAP): NO CRACKING, NO DIELECTRIC BREAKDOWN. USE MANDRELS SPECIFIED IN TABLE 6. DIELECTRIC TEST, 2500 VOLTS (RMS), 60 HZ.