FEDERAL SUPPLY CLASS
6145

RATIONALE

THIS DOCUMENT HAS BEEN DECLARED "STABILIZED" BY THE SAE AE-8D WIRE AND CABLE COMMITTEE. THE COMPONENTS ARE WELL ESTABLISHED, ONLY CONTROLLED BY QUALITY CONFORMANCE INSPECTION WITH NO QUALIFICATION REQUIREMENTS.

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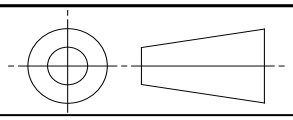
ISSUED 2020-02 REVISED 2020-10 STABILIZED 2021-01

For more information on this standard, visit
https://www.sae.org/standards/content/AS5419/8B/

THIRD ANGLE PROJECTION



CUSTODIAN: AE-8D

PROCUREMENT SPECIFICATION: AS5419

SAE INTERNATIONAL

AEROSPACE STANDARD

WIRE, THERMOCOUPLE, SMOOTH SURFACE, FP/POLYIMIDE/FP INSULATED, NICKEL/CHROMIUM (KP); NICKEL/ALUMINUM/MANGANESE (KN) THERMOCOUPLE EXTENSION. LIGHT WEIGHT. 260 °C

AS5419™/8

REV. B

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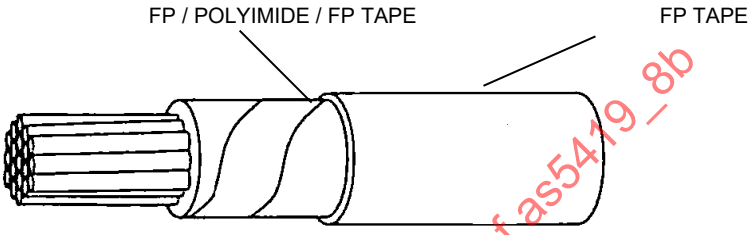
NOTICE

THE COMPLETE REQUIREMENTS FOR PROCURING THE PRODUCT DESCRIBED HEREIN SHALL CONSIST OF THIS DOCUMENT AND THE LATEST ISSUE OF AS5419.

TYPE “K” THERMOCOUPLE CONDUCTORS ARE TYPICALLY USED AS EXTENSION LEADS FOR AEROSPACE APPLICATION. THESE WIRES ARE ONLY TO BE USED IN A MATCHED PAIR AND PROCURED UNDER AS5419. THERMOCOUPLE EXTENSION WIRES ARE CALIBRATED FOR USE TOGETHER IN FABRICATING THERMOCOUPLES. IF EACH LEG OF THE THERMOCOUPLE EXTENSION WIRE IS FROM A DIFFERENT LOT, RECALIBRATION OF THE THERMOCOUPLE PAIR WILL BE REQUIRED.



SIZE 22 THROUGH 14

FP – FLUOROCARBON POLYMER MODIFIED POLYTETRAFLUOROETHYLENE (PTFE)
CONDUCTOR – STRANDED TYPE “K” THERMOCOUPLE

FIGURE 1 - WIRE, THERMOCOUPLE, SMOOTH SURFACE, FP/POLYIMIDE/FP, COMPONENT WIRE INSULATION SYSTEM MUST CONFORM TO THE SIMILAR WIRE TYPE DESIGNATED IN TABLE 1 OF AS5419. MANUFACTURERS MUST BE QUALIFIED TO AS22759/191 TO PRODUCE THIS PRODUCT.

TABLE 1 - KP CONSTRUCTION DETAILS

TABLE 1A - KP CONSTRUCTION DETAILS, INCH-POUND UNITS

PART NUMBER 1/	WIRE SIZE	STRANDING (NUMBER OF STRANDS X AWG OF STRANDS)	DIAMETER OF STRANDED CONDUCTOR (IN)		RESISTANCE (OHMS/1000 FT) AT 20 °C		FINISHED WIRE DIAMETER (IN)		WEIGHT (LB/1000 FT) (MAX)
			(MIN)	(MAX)	(MIN)	(MAX)	(MIN)	(MAX)	
DP-22KPS-9 DP-22KPH-9	22	19X34	.029	.033	546.7	604.3	.041	.046	3.2
DP-20KPS-9 DP-20KPH-9	20	19X32	.037	.041	339.2	375.0	.049	.055	4.7
DP-18KPS-9 DP-18KPH-9	18	19X30	.046	.051	217.0	240.0	.056	.063	6.9
DP-16KPS-9 DP-16KPH-9	16	19X29	.052	.058	169.7	187.7	.065	.072	8.9
DP-14KPS-9 DP-14KPH-9	14	19X27	.065	.073	107.6	119.0	.078	.086	13.7

TABLE 1B - KP CONSTRUCTION DETAILS, SI UNITS

PART NUMBER 1/	WIRE SIZE	STRANDING (NUMBER OF STRANDS X AWG OF STRANDS)	DIAMETER OF STRANDED CONDUCTOR (MM)		RESISTANCE (OHMS/KM) AT 20 °C		FINISHED WIRE DIAMETER (MM)		WEIGHT (KG/KM) (MAX)
			(MIN)	(MAX)	(MIN)	(MAX)	(MIN)	MAX)	
DP-22KPS-9 DP-22KPH-9	22	19X34	0.737	0.838	1793.6	1982.6	1.04	1.17	4.76
DP-20KPS-9 DP-20KPH-9	20	19X32	0.940	1.04	1112.9	1230.3	1.25	1.40	6.96
DP-18KPS-9 DP-18KPH-9	18	19X30	1.17	1.30	711.9	787.4	1.50	1.65	10.21
DP-16KPS-9 DP-16KPH-9	16	19X29	1.32	1.47	556.8	615.8	1.68	1.83	13.17
DP-14KPS-9 DP-14KPH-9	14	19X27	1.65	1.85	353.0	390.4	2.01	2.18	20.27

1/ THE COLOR (-9) SHALL BE WHITE ONLY.

NOTES:

ELECTROMOTIVE FORCE (EMF) DESIGNATOR = FOR TYPE KPS CONDUCTOR USE STANDARD LIMITS IN ASTM E230.
= TYPE KPH CONDUCTOR USE SPECIAL LIMITS IN ASTM E230.

EXAMPLE: SIZE 20 STANDARD EMF LIMITS - DP-20KPS-9; SIZE 20 SPECIAL EMF LIMITS - DP-20KPH-9.

THESE WIRES COMPLY WITH THE SEALING RANGE REQUIREMENT FOR FIREWALL CONNECTORS AS SPECIFIED IN AS50151, MIL-DTL-83723 (REFER TO MIL-DTL-83723 SUPERSESSION DATA), EXCEPT THAT 20 AWG WIRE IS NOT COMPATIBLE WITH MINIMUM SEALING RANGE OF MIL-DTL-38999 16 AWG CONTACTS AND 14 AWG WIRE IS NOT COMPATIBLE WITH MINIMUM SEALING RANGE OF MIL-DTL-83723 (REFER TO MIL-DTL-83723 SUPERSESSION DATA) AND MIL-DTL-38999 12 AWG CONTACTS.

TABLE 2 - KN CONSTRUCTION DETAILS

TABLE 2A - KN CONSTRUCTION DETAILS, INCH-POUND UNITS

PART NUMBER 1/	WIRE SIZE	STRANDING (NUMBER OF STRANDS X AWG OF STRANDS)	DIAMETER OF STRANDED CONDUCTOR (IN)		RESISTANCE (OHMS/1000 FT) AT 20 °C		FINISHED WIRE DIAMETER (IN)		WEIGHT (LB/1000 FT) (MAX)
			(MIN)	(MAX)	(MIN)	(MAX)	(MIN)	(MAX)	
DP-22KNS-5 DP-22KNH-5	22	19X34	.029	.033	228.2	252.3	.041	.046	3.2
DP-20KNS-5 DP-20KNH-5	20	19X32	.037	.041	141.5	156.5	.049	.055	4.7
DP-18KNS-5 DP-18KNH-5	18	19X30	.046	.051	90.5	100.2	.059	.065	6.9
DP-16KNS-5 DP-16KNH-5	16	19X29	.052	.058	70.6	78.2	.066	.072	8.9
DP-14KNS-5 DP-14KNH-5	14	19X27	.065	.073	44.9	49.7	.079	.086	13.7

TABLE 2B - KN CONSTRUCTION DETAILS, SI UNITS

PART NUMBER 1/	WIRE SIZE	STRANDING (NUMBER OF STRANDS X AWG OF STRANDS)	DIAMETER OF STRANDED CONDUCTOR (MM)		RESISTANCE (OHMS/KM) AT 20 °C		FINISHED WIRE DIAMETER (MM)		WEIGHT (KG/KM) (MAX)
			(MIN)	MAX)	(MIN)	(MAX)	(MIN)	(MAX)	
DP-22KNS-5 DP-22KNH-5	22	19X34	0.737	0.838	748.7	827.8	1.04	1.17	4.76
DP-20KNS-5 DP-20KNH-5	20	19X32	0.940	1.04	464.2	513.5	1.25	1.40	6.98
DP-18KNS-5 DP-18KNH-5	18	19X30	1.17	1.30	296.9	328.6	1.50	1.65	10.21
DP-16KNS-5 DP-16KNH-5	16	19X29	1.32	1.47	231.6	256.6	1.68	1.83	13.17
DP-14KNS-5 DP-14KNH-5	14	19X27	1.65	1.85	147.6	163.1	2.01	2.18	20.27

1/ THE COLOR (-5) SHALL BE GREEN ONLY.

NOTES:

ELECTROMOTIVE FORCE (EMF) DESIGNATOR = FOR TYPE KPS CONDUCTOR USE STANDARD LIMITS IN ASTM E230.
= FOR TYPE KPH CONDUCTOR USE SPECIAL LIMITS IN ASTM E230.

EXAMPLE: SIZE 20 STANDARD EMF LIMITS - DP-20KNS-5; SIZE 20 SPECIAL EMF LIMITS - DP-20KNH-5.

THESE WIRES COMPLY WITH THE SEALING RANGE REQUIREMENT FOR FIREWALL CONNECTORS AS SPECIFIED IN AS50151, MIL-DTL-83723 (REFER TO MIL-DTL-83723 SUPERSESSION DATA), EXCEPT THAT 20 AWG WIRE IS NOT COMPATIBLE WITH MINIMUM SEALING RANGE OF MIL-DTL-38999 16 AWG CONTACTS AND 14 AWG WIRE IS NOT COMPATIBLE WITH MINIMUM SEALING RANGE OF MIL-DTL-83723 (REFER TO MIL-DTL-83723 SUPERSESSION DATA) AND MIL-DTL-38999 12 AWG CONTACTS.

REQUIREMENTS: ALL REQUIREMENTS SHALL CONSIST OF THIS DOCUMENT AND THE LATEST ISSUE OF AS22759.

1. WIRE CONSTRUCTION:

   WIRE CONSTRUCTION SHALL BE IN ACCORDANCE WITH FIGURE 1 AND TABLES 1, 2, 3, 4, AND 5.

TABLE 3 - WIRE INSULATION MATERIALS 1/

TAPE CODE	THICKNESS (NOM)	MATERIAL
1	.0012	.00045 (FP)/.00065 (POLYIMIDE)/.0001 (FP)
2	.0020	FP (UNSINTERED)
3	.0025	FP (UNSINTERED)

1/ PHYSICAL PROPERTIES OF THE FP UNSINTERED TAPES SHALL BE IN ACCORDANCE WITH AS22759 REQUIREMENTS.

TABLE 4 - PHYSICAL PROPERTIES OF FP/POLYIMIDE/FP TAPE

TENSILE STRENGTH	20000 LB/IN SQ (AVERAGE MINIMUM)
TENSILE MODULUS	400000 LB/IN SQ (AVERAGE MINIMUM)
ELONGATION	40% (AVERAGE MINIMUM)
DIELECTRIC STRENGTH	4000 VOLTS/MIL (AVERAGE MINIMUM)
.00045 FP LAYER	DISTINGUISHABLE COLOR (NEXT TO CONDUCTOR)

TABLE 5 - 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	
22	1	50.5	54.0	4	50.5	54.0	5.8
20	1	50.5	54.0	4	50.5	54.0	5.8
18	1	50.5	54.0	4	50.5	54.0	5.8
16	1	50.5	54.0	5	50.5	54.0	5.8
14	1	50.5	54.0	5	50.5	54.0	5.8

1/ WRAP 1 IS THE INNERMOST TAPE WHICH IS IN CONTACT WITH THE CONDUCTOR WITH THE .00045 INCH FP SIDE OF THE TAPE AGAINST THE CONDUCTOR.

2. WIRE PERFORMANCE RATINGS:

   TEMPERATURE RATING: 260 °C (500 °F) MAX CONTINUOUS CONDUCTOR TEMPERATURE.

   VOLTAGE RATING: NOT REQUIRED.

3. MATERIALS AND PHYSICAL PROPERTIES:

   REFER TO AS22759 FOR MATERIAL REQUIREMENT. MATERIALS USED IN THE MANUFACTURE OF THESE PRODUCTS SHALL COMPLY WITH THE RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE 2002/95/EC.

4. FINISHED WIRE INSULATION PROPERTIES:

   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% OF THE WIRE.

   IMPULSE DIELECTRIC TEST: 8.0 KILOVOLTS (PEAK), 100%. TEST IN ACCORDANCE TO AS4373, METHOD 503.

   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. TEST IN ACCORDANCE WITH AS4373, METHOD 813.

   INSULATION RESISTANCE (MIN): 5000 MEGOHMS FOR 1000 FEET (1524 MEGOHMS FOR 1.0 KM). TEST IN ACCORDANCE WITH AS4373, METHOD 504.

   SHRINKAGE: .091 INCH (2.31 MM) (MAX) AT 290 °C ± 2 °C (554 °F ± 3.6 °F). TEST IN ACCORDANCE WITH AS4373, METHOD 104.

STRIPABILITY (GROUP II QUALITY CONFORMANCE TEST): TEST IN ACCORDANCE WITH ASTM D3032, SECTION 27. THE LENGTH OF THE INSULATION SLUGS SHALL BE .25 INCH (6.35 MM). THE MAXIMUM STRIP FORCE SHALL BE 4 POUNDS (1.8 KG) FOR SIZES 20-22 AND 6 POUNDS (2.7 KG) FOR SIZES 18-14. NO EVIDENCE OF INSULATION LEFT ON THE CONDUCTOR WHEN VIEWED WITH THE NAKED EYE.

WET DIELECTRIC TEST: 2500 VOLTS (RMS) 60 HZ. TEST IN ACCORDANCE WITH AS4373, METHOD 509.

5. FINISHED WIRE IDENTIFICATION:

COLOR: IN ACCORDANCE WITH MIL-STD-104, CLASS 1: WHITE AND GREEN ONLY. CONFORMITY OF COLOR TO THE LIMITS OF MIL-STD-104 SHALL NOT BE REQUIRED AFTER OVEN EXPOSURE.

IDENTIFICATION: THE FINISHED WIRE SHALL BE IDENTIFIED BY A PRINTED MARKING APPLIED TO THE OUTER SURFACE OF THE WIRE. THE PRINTED MARKING SHALL BE LEGIBLE, BLACK IN COLOR, AND WITHSTAND A DURABILITY TEST OF 125 CYCLES (250 STROKES) (MIN), 250 GRAMS WEIGHT. TEST IN ACCORDANCE WITH AS4373, METHOD 301. THE SIZE OF THE PRINTED CHARACTERS SHALL BE CONSISTENT WITH THE MAGNITUDE OF THE SURFACE UPON WHICH IT IS PRINTED. THE DISTANCE BETWEEN THE END OF ONE MARK AND THE BEGINNING OF THE NEXT SHALL BE A MAXIMUM OF 12 INCHES. THE PRINTED MARKING SHALL BE APPLIED WITH THE VERTICAL AXES OF THE PRINT CHARACTERS LENGTHWISE ON WIRE WHOSE NOMINAL DIAMETER IS .050 INCH (1.27 MM) OR SMALLER. THE VERTICAL AXES OF THE PRINTED CHARACTERS MAY BE CROSSWISE OR LENGTHWISE ON WIRE WHOSE NOMINAL DIAMETER IS .051 INCH (1.30 MM) OR LARGER.

6. FINISHED WIRE PERFORMANCE:

FINISH WIRE FIXTURE APPLICABLE TO EACH WIRE SIZE SHALL BE IN ACCORDANCE WITH TABLE 8.

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 70 WIRES PASS THE DIELECTRIC 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 INCH (25.4 MM) 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 70 WIRES PASS THE DIELECTRIC 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 INCH (25.4 MM) IN ANY TEST BUNDLE.

BLOCKING: 260 °C ± 2 °C (500 °F ± 3.6 °F).

DYNAMIC CUT-THROUGH (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH AS4373, METHOD 703. BLADE SHALL BE STANDARD CUTTING BLADE EXCEPT THE CUTTING-EDGE RADIUS SHALL BE .005 INCH ± .001 INCH. MINIMUM AVERAGE DYNAMIC CUT-THROUGH (LB) SHALL BE AS FOLLOWS:

TABLE 6 - DYNAMIC CUT-THROUGH REQUIREMENTS

WIRE SIZE	23 °C ± 5 °C	150 °C ± 5 °C	200 °C ± 5 °C
20	25 LB	20 LB	15 LB
16	25 LB	20 LB	15 LB

FLAMMABILITY: TEST IN ACCORDANCE WITH AS4373, METHOD 801.

REQUIREMENTS:

1. DURATION AFTER-FLAME: 3.0 SECONDS (MAX).
   FLAME TRAVEL: 3.0 INCHES (MAX).
   NO FLAMING OF TISSUE.

2. HUMIDITY RESISTANCE: AFTER HUMIDITY EXPOSURE, WIRE SHALL MEET THE REQUIREMENT FOR INITIAL INSULATION RESISTANCE. TEST IN ACCORDANCE WITH AS4373, METHOD 603.

3. IMMERSION (TEST REQUIRED FOR INITIAL QUALIFICATION ONLY): TEST IN ACCORDANCE WITH AS4373, METHOD 601, INCLUDING ADDITIONAL FLUIDS OF TABLE 7. FOR THE TURBINE FUEL IMMERSION TEST OF AS4373, EITHER JP-4 OR MIL-T-83122 TYPE JP- 8 (NATO TYPE F-34) MAY BE USED.