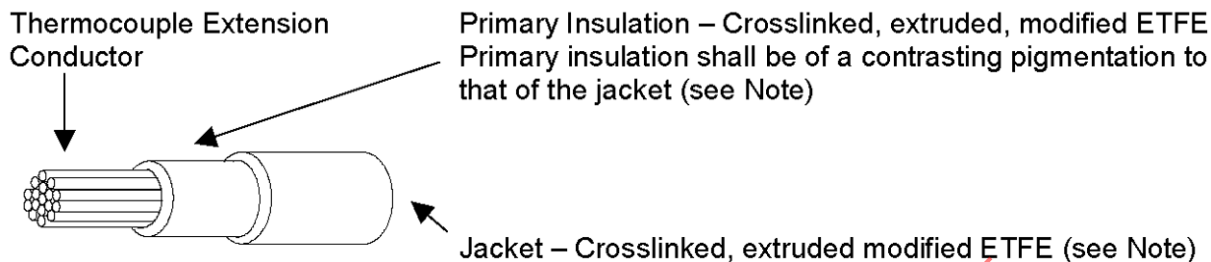


RATIONALE

FEDERAL SUPPLY CLASS

AS5419/5 HAS BEEN REAFFIRMED TO COMPLY WITH THE SAE FIVE-YEAR REVIEW POLICY.

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.



Primary Insulation – Crosslinked, extruded, modified ETFE
Primary insulation shall be of a contrasting pigmentation to that of the jacket (see Note)

Jacket – Crosslinked, extruded modified ETFE (see Note)

NOTE
ETFE – Ethylene Tetrafluoroethylene Copolymer

FIGURE 1 - Wire, Thermocouple, Crosslinked Modified ETFE
Component wire insulation system must conform to the similar wire type designated in Table 1 of AS5419. Manufacturers must be qualified to AS22759/43 to produce this product.

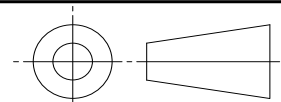
TABLE 1 - KP Construction Details

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/1,000 ft) at 20 °C		Finished Wire	
			(min)	(max)	(min)	(max)	Diameter (in)	Weight (lb/1,000 ft) (max)
SW-22KPS-9	22	19 X 34	0.029	0.033	546.7	604.3	0.050 ± 0.002	3.21
SW-22KPH-9	"	"	"	"	"	"	"	"
SW-20KPS-9	20	19 X 32	0.037	0.041	339.2	375.0	0.058 ± 0.002	4.7
SW-20KPH-9	"	"	"	"	"	"	"	"
SW-18KPS-9	18	19 X 30	0.046	0.051	217.0	240.0	0.070 ± 0.003	7.2
SW-18KPH-9	"	"	"	"	"	"	"	"
SW-16KPS-9	16	19 X 29	0.052	0.058	169.7	187.7	0.077 ± 0.003	9.0
SW-16KPH-9	"	"	"	"	"	"	"	"
SW-14KPS-9	14	19 X 27	0.065	0.073	107.6	119.0	0.094 ± 0.003	13.8
SW-14KPH-9	"	"	"	"	"	"	"	"

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on this Technical Report, please visit
<http://www.sae.org/technical/standards/AS5419/5>

THIRD ANGLE PROJECTION



CUSTODIAN: AE-8/AE-8D



AEROSPACE STANDARD

WIRE, THERMOCOUPLE, FLUOROPOLYMER INSULATED,
CROSSLINKED MODIFIED ETFE, NORMAL WEIGHT, NICKEL/
CHROMIUM (KP); NICKEL/ALUMINUM/MANGANESE (KN),
THERMOCOUPLE EXTENSION, 200 °C

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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	
			(min)	(max)	(min)	(max)	Diameter (mm)	Weight (kg/km) (max)
SP-22KPS-9	22	19 X 34	0.737	0.838	1793.6	1982.6	1.270 ± 0.051	4.8
SP-22KPH-9	"	"	"	"	"	"	"	"
SP-20KPS-9	20	19 X 32	0.940	1.04	1112.9	1230.3	1.473 ± 0.051	7.0
SP-20KPH-9	"	"	"	"	"	"	"	"
SP-18KPS-9	18	19 X 30	1.17	1.30	711.9	787.4	1.778 ± 0.076	10.7
SP-18KPH-9	"	"	"	"	"	"	"	"
SP-16KPS-9	16	19 X 29	1.32	1.47	556.8	615.8	1.956 ± 0.076	13.4
SP-16KPH-9	"	"	"	"	"	"	"	"
SP-14KPS-9	14	19 X 27	1.65	1.85	353.0	390.4	2.388 ± 0.076	20.5
SP-14KPH-9	"	"	"	"	"	"	"	"

¹ The color shall be white only.

Notes

Electromotive Force (EMF) designator = Type KPS conductor from ANSI/MC96.1 with standard limits
= Type KPH conductor from ANSI/MC96.1 with special limits

Example: Size 20 standard EMF limits - SW-20KPS-9; Size 20 special EMF limits - SW-20KPH-9

These wires comply with the sealing range requirement for firewall connectors as specified in MIL-DTL-5015, MIL-DTL-38999, and MIL-C-83723 (superseded by MIL-C-26482 and MS3470 which are inactive for new design) 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-C-83723 (superseded by MIL-C-26482 and MS3470 which are inactive for new design) 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/1,000 ft) at 20 °C		Finished Wire	
			(min)	(max)	(min)	(max)	Diameter (in)	Weight (lb/1,000 ft) (max)
SP-22KNS-5	22	19 X 34	0.029	0.033	228.2	252.3	0.050 ± 0.002	3.21
SP-22KNH-5	"	"	"	"	"	"	"	"
SP-20KNS-5	20	19 X 32	0.037	0.041	141.5	156.5	0.058 ± 0.002	4.7
SP-20KNH-5	"	"	"	"	"	"	"	"
SP-18KNS-5	18	19 X 30	0.046	0.051	90.5	100.2	0.070 ± 0.003	7.2
SP-18KNH-5	"	"	"	"	"	"	"	"
SP-16KNS-5	16	19 X 29	0.052	0.058	70.6	78.2	0.077 ± 0.003	9.0
SP-16KNH-5	"	"	"	"	"	"	"	"
SP-14KNS-5	14	19 X 27	0.065	0.073	44.9	49.7	0.094 ± 0.003	13.8
SP-14KNH-5	"	"	"	"	"	"	"	"



AEROSPACE STANDARD

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THERMOCOUPLE EXTENSION, 200 °C

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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	
			(min)	(max)	(min)	(max)	Diameter (mm)	Weight (kg/km) (max)
SP-22KNS-5 SP-22KNH-5	22 "	19 X 34 "	0.737 "	0.838 "	748.7 "	827.8 "	1.270 ± 0.051 "	4.8 "
SP-20KNS-5 SP-20KNH-5	20 "	19 X 32 "	0.940 "	1.04 "	464.2 "	513.5 "	1.473 ± 0.051 "	7.0 "
SP-18KNS-5 SP-18KNH-5	18 "	19 X 30 "	1.17 "	1.30 "	296.9 "	328.7 "	1.778 ± 0.076 "	10.7 "
SP-16KNS-5 SP-16KNH-5	16 "	19 X 29 "	1.32 "	1.47 "	231.6 "	256.6 "	1.956 ± 0.076 "	13.4 "
SP-14KNS-5 SP-14KNH-5	14 "	19 X 27 "	1.65 "	1.85 "	147.6 "	163.1 "	2.388 ± 0.076 "	20.5 "

¹ The color shall be green only.

Notes

Electromotive Force (EMF) designator = Type KNS conductor from ANSI/MC96.1 with standard limits
= Type KNH conductor from ANSI/MC96.1 with special limits

Example: Size 20 standard EMF limits - SW-20KNS-5; Size 20 special EMF limits - SW-20KNH-5

These wires comply with the sealing range requirement for firewall connectors as specified in MIL-DTL-5015, MIL-DTL-38999, and MIL-C-83723 (superseded by MIL-C-26482 and MS3470 which are inactive for new design) 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-C-83723 (superseded by MIL-C-26482 and MS3470 which are inactive for new design) and MIL-DTL-38999 12 awg contacts.



AEROSPACE STANDARD

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THERMOCOUPLE EXTENSION, 200 °C

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TABLE 3 - Performance Details

TABLE 3A - Performance Details, inch-pound Units

Part number ¹	Bend Testing			
	Mandrel Diameter (in) ($\pm 3\%$) Crosslinking proof, immersion and life cycle tests ²	Cold bend test	Test Load (lb) ($\pm 3\%$) Crosslinking proof, immersion and life cycle tests ²	Cold bend test
SP-22KXS SP-22KXH	0.500 "	1.00 "	1.00 "	3.00 "
SP-20KXS SP-20KXH	0.500 "	1.00 "	1.50 "	4.00 "
SP-18KXS SP-18KXH	0.750 "	1.50 "	2.00 "	4.00 "
SP-16KXS SP-16KXH	1.00 "	1.50 "	2.00 "	5.00 "
SP-14KXS SP-14KXH	1.00 "	2.00 "	3.00 "	5.00 "

TABLE 3B - Performance Details, SI Units

Part number ¹	Bend Testing			
	Mandrel Diameter (mm) ($\pm 3\%$) Life cycle (oven and bend tests) ²	Cold bend test	Test Load (kg) ($\pm 3\%$) Life cycle (oven and bend tests) ²	Cold bend test
SP-22KXS SP-22KXH	12.7 "	25.4 "	.454 "	1.36 "
SP-20KXS SP-20KXH	12.7 "	25.4 "	.680 "	1.81 "
SP-18KXS SP-18KXH	19.1 "	38.1 "	.907 "	1.81 "
SP-16KXS SP-16KXH	25.4 "	38.1 "	.907 "	2.27 "
SP-14KXS SP-14KXH	25.4 "	50.8 "	1.36 "	2.27 "

¹ The letter "X" has been substituted for the letters "P" positive or "N" negative conductor types when used as a matched pair and the requirements are applicable to both positive and negative wires.

² Also for bend tests after immersion.



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CROSSLINKED MODIFIED ETFE, NORMAL WEIGHT, NICKEL/
CHROMIUM (KP); NICKEL/ALUMINUM/MANGANESE (KN),
THERMOCOUPLE EXTENSION, 200 °C

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WIRE RATINGS AND ADDITIONAL REQUIREMENTS

TEMPERATURE RATING: 200 °C (392 °F) max continuous conductor temperature

VOLTAGE RATING: Not applicable

ACCELERATED AGING: Oven temperature, 300 °C $\pm$ 2 °C (572 °F $\pm$ 3.6 °F) for 6 hours; for identification legibility 225 °C $\pm$ 2 °C (437 °F $\pm$ 3.6 °F) for 6 hours

BLOCKING: 230 °C $\pm$ 3 °C (392 °F $\pm$ 5.4 °F)

FLAMMABILITY: For requirements and procedures see below

HUMIDITY RESISTANCE: After humidity exposure, wire shall meet the requirement for initial insulation resistance

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), 500 grams weight. 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 in. The printed marking shall be applied with the vertical axes of the print characters lengthwise on wire whose nominal diameter is 0.050 in (1.27 mm) or smaller. The vertical axes of the printed characters may be crosswise or lengthwise on wire whose nominal diameter is 0.051 in (1.30 mm) or larger.

IMPULSE DIELECTRIC TEST: 8.0 kilovolts (peak), 100% test

INSULATION RESISTANCE (min): 5,000 megohms for 1,000 ft (1,524 megohms for 1.0 km)

LIFE CYCLE: 500 hours at 230 °C $\pm$ 3 °C (446 °F $\pm$ 5.4 °F) Dielectric test, 2,500 volts (rms), 60 Hz

CROSSLINKING PROOF TEST: 7 hours at 300 °C $\pm$ 3 °C (572 °F $\pm$ 5.4 °F). Quality conformance test, Group II. Requirements and procedures as for life cycle except for time and temperature.

DIELECTRIC TEST AFTER IMMERSION: 2,500 volts (rms), 60 Hz

INSULATION THICKNESS:

0.003 in (min) for primary insulation

0.004 in (min) for outer jacket

0.008 in (min) for total insulation

LOW TEMPERATURE (Cold Bend): Bend temperature, -65 °C $\pm$ 3 °C (-85 °F $\pm$ 5.4 °F) Dielectric test, 2,500 volts (rms), 60 Hz

IMMERSION: For procedure see below

PHYSICAL PROPERTIES OF INSULATION: Pulled at 2 in per minute. Primary insulation shall be separated from the outer jacket for determination of primary insulation tensile strength and elongation

Tensile strength, 5,000 lbf/in² (min) for primary insulation, 5,000 lbf/in² (min) for total insulation (primary insulation and jacket)

Elongation, 125% (min) for primary insulation (AWG 22-14), 75% (min) for total insulation (primary insulation and jacket)

PROPELLANT RESISTANCE: No dielectric breakdown. For procedure see below.

SHRINKAGE: 0.125 in (max) at 200 °C $\pm$ 3 °C (392 °F $\pm$ 5.4 °F)

SMOKE: 230 °C $\pm$ 2 °C (446 °F $\pm$ 3.6 °F); no visible smoke

SPARK TEST OF PRIMARY INSULATION: 1,500 volts (rms), 60 Hz

SURFACE RESISTANCE: 500 megohms-in (min), initial and final readings



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THERMOCOUPLE EXTENSION, 200 °C

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WIRE RATINGS AND ADDITIONAL REQUIREMENTS (Continued)

THERMAL SHOCK RESISTANCE: Oven temperature, 200 °C ± 3 °C (392 °F ± 5.4 °F); max change in measurement 0.060 in

WICKING: Procedure II; weight increase, no requirement. Dye travel between layers of insulation, 2.25 in (max) from end of specimen

WRAP TEST: "Wrap back" test. Oven temperature, 313 °C ± 3 °C (595 °F ± 5.4 °F)

FLAMMABILITY REQUIREMENTS AND PROCEDURE

Test in accordance with AS4373, Method 801

IMMERSION PROCEDURE

Test in accordance with AS4373, Method 601, using the fluids of Table 4 of this supplement. Use mandrels and weights listed in Table 3 of this supplement for bend testing. Dielectric test using 2,500 volts (rms) 60 Hz.

PROPELLANT RESISTANCE PROCEDURE

(Initial qualification test only) Test in accordance with AS4373, Method 605. Dielectric test using 2,500 volts (rms) 60 Hz.

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AEROSPACE STANDARD

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CROSSLINKED MODIFIED ETFE, NORMAL WEIGHT, NICKEL/
CHROMIUM (KP); NICKEL/ALUMINUM/MANGANESE (KN),
THERMOCOUPLE EXTENSION, 200 °C

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