

RATIONALE

NEWLY CREATED SPECIFIC CABLE SLANT SHEETS FOR HIGH SPEED DATA PROTOCOLS ARE HEREBY DEFINED IN SUPPORT OF AS6070.

AS6070/4

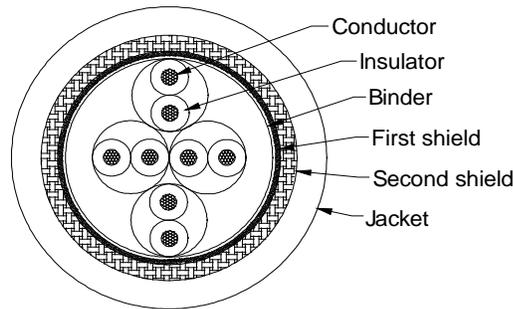


FIGURE 1 - FOUR PAIR CONFIGURATION

1. CONSTRUCTION DETAILS

TABLE 1

COMPONENT	MATERIAL	REQUIREMENT
CONDUCTOR *	24 AWG 19X36 SILVER PLATED COPPER ALLOY	.0244 INCH MAX.
INSULATION	FLUOROPOLYMER	.045 INCH ± .003 INCH
COLORS **	PAIR 1: WHITE/BLUE & BLUE PAIR 2: WHITE/ORANGE & ORANGE PAIR 3: WHITE/GREEN & GREEN PAIR 4: WHITE/BROWN & BROWN	
BINDER	PTFE TAPE	
INNER SHIELD	FIRST SHIELD: ALUMINUM/POLYIMIDE FOIL	100% COVERAGE
OUTER SHIELD	SECOND SHIELD: ROUND SILVER PLATED COPPER BRAID	85% MIN. COVERAGE
JACKET	FEP	.255 INCH ± .010 INCH
COLOR	PER ORDER	
CABLE WEIGHT		52.0 POUNDS/1000 FEET MAX

\* CONDUCTOR SHALL BE IN ACCORDANCE WITH TYPE SCA OR SCA1 OF AS29606 TABLE 4C.

\*\* PAIRS ALSO ACCEPTABLE AS WHITE WITH SOLID COLORS (WHITE & BLUE, WHITE & ORANGE, WHITE & GREEN, AND WHITE & BROWN). COLOR OF MATED WIRE PER AS6070.

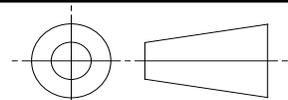
2. ENGINEERING INFORMATION

- 2.1 CONTINUOUS WORKING VOLTAGE\*: 60 V DC
- 2.2 OPERATING FREQUENCY: 1 - 100 MHz
- 2.3 OPERATING TEMP RANGE: -55 TO +150 °C
- 2.4 STORAGE TEMPERATURE: -55 TO +150 °C
- 2.5 CONDUCTOR DCR (BEFORE CABLING) @ 20 °C: 28.4 OHMS/1000 FEET MAX
- 2.6 CABLE MINIMUM BEND RADIUS: 2.50 INCHES

\* THIS INSULATION SYSTEM IS DESIGNED TO BE USED IN AEROSPACE APPLICATIONS USING 60 VOLTS OR LESS VERIFICATION OF THE SUITABILITY OF THIS PRODUCT FOR USE IN OTHER ELECTRICAL SYSTEM CONFIGURATIONS IS THE RESPONSIBILITY OF THE USER.

SAE values your input. To provide feedback on this Technical Report, please visit [http://www.sae.org/technical/standards/AS6070\\_4](http://www.sae.org/technical/standards/AS6070_4)

THIRD ANGLE PROJECTION



CUSTODIAN: AE-8/AE-8D

PROCUREMENT SPECIFICATION: AS6070



**AEROSPACE STANDARD**

CABLE, 4 PAIR 24 AWG  
COPPER ALLOY, SHIELDED, 100 OHM, 150 °C,  
ETHERNET 1000 BASE T

**AS6070/4**  
SHEET 1 OF 5

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3. PERFORMANCE REQUIREMENTS PER AS6070 UNLESS OTHERWISE SPECIFIED

3.1 LIFE CYCLE

REQUIREMENT: WIRE INSULATION SHALL NOT SHRINK MORE THAN .090 INCH AND JACKET INSULATION DOES NOT SHRINK MORE THAN .150 INCH. NO MANDREL OR WEIGHTS ARE REQUIRED DURING THE LIFE CYCLE TEST. PERFORM THE BEND TEST AFTER OVEN AGING. JACKET AND COMPONENT WIRES SHALL MEET DIELECTRIC WITHSTAND REQUIREMENTS.

3.2 BEND

REQUIRED AFTER LIFE CYCLE AND FLUID IMMERSION. THE JACKET AND COMPONENT WIRES SHALL MEET DIELECTRIC WITHSTAND REQUIREMENTS. MANDREL SIZE: 10 TIMES CABLE DIAMETER. WEIGHTS: NONE. WRAP CABLE BY HAND AROUND MANDREL WITH SUFFICIENT TENSION TO HOLD CABLE FIRMLY AGAINST MANDREL.

3.3 BLOCKING

REQUIREMENT: 200 °C ± 5 °C; MANDREL SIZE: 10 TIMES CABLE DIAMETER. NO BLOCKING BETWEEN ADJACENT LAYERS ALLOWED. JACKET AND COMPONENT WIRES MEET DIELECTRIC WITHSTAND REQUIREMENTS.

3.4 COLD BEND

REQUIREMENT: -55 °C ± 5 °C; MANDREL SIZE: 10 TIMES CABLE DIAMETER. NO CRACKING OF JACKET ALLOWED. JACKET AND COMPONENT WIRES MEET DIELECTRIC WITHSTAND REQUIREMENTS.

3.5 CONDUCTOR ELONGATION AND TENSILE BREAK STRENGTH (SEE AS29606, TABLE 4C)

REQUIREMENT: 6% AND 22.4 POUNDS MIN.

3.6 DIELECTRIC WITHSTAND - JACKET

REQUIREMENT: JACKET SHALL WITHSTAND 1000 V RMS FOR 1 MINUTE (SHIELD TO GROUND).

3.7 DIELECTRIC WITHSTAND - COMPONENT WIRES

COMPONENT WIRES SHALL WITHSTAND 1000 V RMS FOR 1 MINUTE COMPONENT TO COMPONENT AND COMPONENT TO SHIELD. NO SPECIAL PREPARATION OR CONDITIONS APPLY.

3.8 DIMENSIONAL

REQUIREMENT: PER TABLE 1 CONSTRUCTION DETAILS AND FIGURE 1.

3.9 FLAMMABILITY

REQUIREMENT: (60° TEST METHOD) MAXIMUM FLAME TRAVEL 3 INCHES, NO EVIDENCE OF FLAMING PARTICLES AND FLAME EXTINGUISH TIME 5 SECONDS MAX.

3.10 FLUID IMMERSION

REQUIREMENT: DIAMETER OF THE CABLE DOES NOT CHANGE MORE THAN 5%. JACKET DOES NOT CRACK. AFTER BEND TEST, THE JACKET AND COMPONENT WIRES SHALL MEET DIELECTRIC WITHSTAND REQUIREMENTS.

3.11 HUMIDITY RESISTANCE

REQUIREMENT: MUST PASS DIELECTRIC WITHSTAND AFTER 15 CYCLES.

3.13 SPARK TEST ON PRIMARY WIRES

REQUIREMENT: INSULATION, 1500 V RMS HIGH FREQUENCY SINE WAVE (3 KHz) SPARK.

3.14 SPARK TEST ON FINISHED CABLE (SHIELD TO GROUND)

REQUIREMENT: JACKET; 1500 V RMS.

3.15 SMOKE QUANTITY

REQUIREMENT: MAXIMUM SPECIFIC OPTICAL DENSITY (DS) IS LESS THAN 50 AFTER 4.0 MINUTES.

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	<b>AEROSPACE STANDARD</b>	<b>AS6070/4</b> SHEET 2 OF 5	
	CABLE, 4 PAIR 24 AWG COPPER ALLOY, SHIELDED, 100 OHM, 150 °C, ETHERNET 1000 BASE T		

3.16 THERMAL SHOCK RESISTANCE

REQUIREMENT: 230 °C ± 5 °C, ENDS DO NOT SHRINK OR EXPAND MORE THAN .25 INCH AND NO JACKET CRACKING. JACKET AND COMPONENT WIRES MEET DIELECTRIC WITHSTAND REQUIREMENTS.

3.17 WEIGHT

REQUIREMENT: PER TABLE 1

3.18 WRINKLE

REQUIREMENT: USING A MANDREL WITH THE RADIUS 10 TIMES THE CABLE DIAMETER THE CABLE SHOWS NO EVIDENCE OF CIRCUMFERENTIAL WRINKLES ON THE INNER RADIUS.

3.19 ATTENUATION

ATTENUATION SHALL MEET THE VALUES DETERMINED BY THE FOLLOWING EQUATION FOR FREQUENCIES FROM 1 TO 100 MHz. TABULATED VALUES ARE GIVEN FOR INFORMATION ONLY.

$$\text{ATTENUATION} \leq 1.37 \times [1.967 \times \sqrt{f} + .023 \times f + 0.050 / \sqrt{f}] \text{ dB/100 m}$$

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
ATTENUATION (dB/100 m)	2.7	5.6	7.9	8.9	11.2	12.7	14.2	16.0	23.3	30.0

3.20 CAPACITANCE UNBALANCED PAIR-GROUND: 66 PF/100 M MAX

3.21 CHARACTERISTIC IMPEDANCE

CHARACTERISTIC IMPEDANCE SHALL BE 100 OHMS (REFERENCE ONLY)

3.22 DIRECT CURRENT RESISTANCE (DCR) UNBALANCED: 3% MAX.

3.23 NEAR END CROSS TALK (NEXT) & NEAR END CROSS TALK (NEXT) ON MANDREL

SHALL MEET THE VALUES DETERMINED BY THE FOLLOWING EQUATION FOR FREQUENCIES FROM 1 TO 100 MHz. TABULATED VALUES ARE GIVEN FOR INFORMATION ONLY.

$$\text{NEXT} \geq \text{NEXT}(100) - 15 \log(f / 100) \text{ dB}$$

NEXT (100) SHALL BE 35.3 dB

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
NEXT (dB)	65.3	56.3	51.8	50.3	47.2	45.8	44.3	42.9	38.4	35.3

3.24 POWER SUM NEAR-END CROSS TALK (PSNEXT)

FOR FREQUENCIES FROM 0.772 TO 100 MHz, PSNEXT SHALL MEET THE VALUES DETERMINED BY THE FOLLOWING EQUATION. TABULATED VALUES ARE GIVEN FOR INFORMATION ONLY.

$$\text{PSNEXT} \geq 32.3 - 15 \log(f / 100)$$

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
PSNEXT (dB)	62.3	53.3	48.8	47.3	44.2	42.8	41.3	39.9	35.4	32.3

3.25 ATTENUATION TO CROSSTALK RATIO-FAR END (ACR-F)

FOR FREQUENCIES FROM 1 TO 100 MHz AND A LENGTH OF 100 M, ACR-F SHALL MEET VALUES DETERMINED BY THE FOLLOWING EQUATION. TABULATED VALUES ARE GIVEN FOR INFORMATION ONLY.

$$\text{ACR-F} \geq 23.8 - 20 \log(f / 100) \text{ dB}$$

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
ACR-F (dB)	63.8	51.8	45.7	43.8	39.7	37.8	35.8	33.9	27.9	23.8

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3.26 POWER SUM ATTENUATION TO CROSSTALK RATIO-FAR END (PSACR-F)

FOR FREQUENCIES FROM 1 TO 100 MHz AND A LENGTH OF 100 M, PSACR-F SHALL MEET VALUES DETERMINED BY THE FOLLOWING EQUATION. TABULATED VALUES ARE GIVEN FOR INFORMATION ONLY.

$PSACR-F \geq 20.8 - 20 \log (f / 100)$  dB

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
PSACR-F (dB)	60.8	48.8	42.7	40.8	36.7	34.8	32.8	30.9	24.9	20.8

3.27 RETURN LOSS (RL)

RETURN LOSS SHALL MEET THE VALUES DETERMINED BY THE FOLLOWING EQUATIONS. TABULATED VALUES ARE GIVEN FOR INFORMATION ONLY.

FREQUENCY (MHz)	ATTENUATION (dB)
$1 \leq f < 10$	$20 + 5 \log (f)$
$10 \leq f < 20$	25
$20 \leq f < 100$	$25 - 8.6 \log (f / 20)$

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
RETURN LOSS (dB)	20.0	23.0	24.5	25.0	25.0	25.0	24.3	23.6	21.5	20.1

3.28 PROPAGATION DELAY

FREQUENCY (MHz)	PROPAGATION DELAY (ns/100 m)
$1 \leq f < 100$	$(534 + 36/\sqrt{f})$

FREQUENCY (MHz)	1.0	4.0	8.0	10.0	16.0	20.0	25.0	31.25	62.5	100.0
PROPAGATION DELAY (ns/100 m)	570	552	547	545	543	542	541	540	539	538

3.29 PROPAGATION DELAY SKEW

PROPAGATION DELAY SKEW SHALL NOT EXCEED 45 NS/100 M.

3.30 VELOCITY OF PROPAGATION (VP) (SEE ASTM D4566, PHASE VELOCITY)

VELOCITY OF PROPAGATION SHALL NOT BE LESS THAN 68% AT 31.25 MHz (REFERENCE ONLY).

4. CABLE IDENTIFICATION

CABLE SHALL BE MARKED WITH THE CABLE PART NUMBER AND MANUFACTURER'S CAGE CODE IN CONTRASTING INK ON EITHER AN INTERNAL MARKER TAPE UNDER THE JACKET OR PRINTED ON THE JACKET SURFACE.

4.1 DURABILITY OF IDENTIFICATION

REQUIREMENT: THREE SPECIMENS SHALL BE TESTED IN ACCORDANCE WITH AND MEET THE REQUIREMENTS OF AS4373 METHOD 710, USING A WEIGHT .5 POUNDS AND 250 STROKES.

5. CONSTRUCTION OPTIONS

TABLE 2

PART NO.	1 <sup>ST</sup> DIGIT CONDUCTOR/SHIELD PLATING	2 <sup>ND</sup> DIGIT PRIMARY INSULATION	3 <sup>RD</sup> DIGIT JACKET COLOR	4 <sup>TH</sup> DIGIT JACKET DETAIL
AS6070/4-XXXX	(0) 40 MICROINCHES (1) 80 MICROINCHES	(A) EXPANDED PTFE/PTFE TAPE (B) FOAMED FEP OR PFA (C) PTFE, FEP, PFA	(0) BLACK (1) BROWN (2) RED (3) RANGE (4) YELLOW (5) GREEN (6) BLUE (7) VIOLET (8) GRAY (9) WHITE	(U) UV LASER MARKABLE (X) TRANSLUCENT COLOR NO DIGIT: NON UV LASER MARKABLE