

RATIONALE

SPECIFICATION UPDATED TO INCLUDE AS29606 CONDUCTOR REQUIREMENTS, ROHS RESTRICTIONS, AND AS22759 MODIFICATIONS. THIS CHANGE ALSO INCREASES THE MAXIMUM WEIGHT REQUIREMENTS FOR WIRE SIZES 8 THROUGH 02 TO ACCOUNT FOR INCREASED CIRCULAR MIL AREA (CMA) ADOPTED IN AS29606. AS22759 IS A CONVERTED MILITARY SPECIFICATION ORIGINALLY NOTED AS MIL-W-22759 CREATED IN 1971. CONDUCTOR REQUIREMENTS WERE ORIGINALLY DEFINED BY ASTM B3, B298, AND B355 FOR TIN, SILVER, AND NICKEL PLATE RESPECTIVELY. THESE SPECIFICATIONS CONTROLLED THE CONDUCTOR BY ESTABLISHING STRAND SIZE, CONDUCTOR SIZE, AND MAXIMUM DCR (DIRECT CURRENT RESISTANCE). BY THE LATE 1980'S CONDUCTOR PRODUCERS WERE PRODUCING TIGHT TOLERANCE CONDUCTORS WHICH WERE MADE AT THE MINIMUM DIMENSIONAL AND MAXIMUM DCR LIMITS OF THE SPECIFICATION TO REDUCE THE WEIGHT (MASS) OF THE FINALLY INSULATED WIRE. BY THE EARLY 1990'S THE TIGHT TOLERANCE CONDUCTORS WERE PREVALENT THROUGHOUT AEROSPACE. ABOUT THE SAME TIME, LARGE GAUGE SIZE CONDUCTORS (SIZE 8 THROUGH 4/0) STARTED EXHIBITING CRIMP FAILURES IN TERMINAL LUGS MOUNTED ON AIRCRAFT GENERATORS. SINCE THESE CIRCUITS ROUTED PRIMARY ELECTRICAL POWER FROM THE GENERATOR TO THE MAIN POWER DISTRIBUTION CENTERS, CRIMP DEGRADATION RESULTING IN DISRUPTION OF ELECTRICAL POWER CAUSED SIGNIFICANT CONCERN. SEVERAL OEM'S AS WELL AS NAVY AND AIR FORCE LABORATORIES INVESTIGATED THE FAILURES AND DETERMINED THAT THE FAILED CRIMPS WERE DUE TO A COMBINATION OF LOW CMA, HIGH VIBRATION AND THERMAL CYCLING. ADDITIONAL TESTING ESTABLISHED MINIMUM CMA LEVELS WHICH WOULD PREVENT THE CRIMP FAILURES. THESE NEW LIMITS WERE OFFERED TO ASTM, BUT REJECTED. NAVAIR THEN PRODUCED AN ENGINEERING POSITION LETTER (EPL) TO MANDATE THE INCREASED CMAS ON STRANDING USED IN AS22759 CONSTRUCTIONS. NAVAIR THEN CREATED MIL-W-29606 WHICH WAS INTENDED TO REPLACE THE ASTM SPECIFICATIONS AS THE REQUIRED CONDUCTOR SPECIFICATION. BEFORE THE MIL-W-29606 COULD BE ADDED TO MIL-W-22759, THE SPECIFICATION TRANSITION AND ADOPTION TOOK PLACE CONVERTING THE DOCUMENTS FROM MILITARY SPECIFICATIONS TO AS DOCUMENTS IN THE 1999 TO 2000 TIME FRAME. SINCE THE EPL NO LONGER HAD LEGAL STANDING AFTER THE CONVERSION, WIRE PRODUCERS DID NOT HAVE TO ABIDE BY THE RESTRICTIONS WHICH ALLOWED THIS ISSUE TO CREEP BACK INTO THE PRODUCTS FROM TIME TO TIME. IN 2011, THE SAE AE-8D COMMITTEE OPENED A PROJECT TO UPDATE THE AS22759 AND ITS ASSOCIATED DETAILED SPECIFICATION SHEETS. WHEN LOOKING AT THIS ISSUE, THE COMMITTEE DECIDED TO ADOPT MIL-W-29606 (NOW AS29606) AND REPLACE THE ASTM REQUIREMENTS WITH THE AS29606 REQUIREMENTS. SINCE THE DIAMETER RANGE OF THE CONDUCTOR STRANDS NEEDED TO SHIFT SLIGHTLY TO THE RIGHT TO MEET THE NEW MINIMUM CMA REQUIREMENTS, OVERALL PRODUCT WEIGHT MAXIMUMS SHIFTED ABOUT 3 TO 5%. THE COMMITTEE EVALUATED SEVERAL METHODS OF INCORPORATING THIS CHANGE INCLUDING CANCELING AND SUPERSESSION, BUT THE END USERS DID NOT WANT TO CHANGE PART NUMBERS FOR PRODUCTS WHICH HAVE BEEN USED IN AEROSPACE AND INDUSTRY FOR OVER 40 YEARS AND IS CURRENTLY ON THOUSANDS OF DRAWINGS. SINCE THESE PRODUCTS ARE PRIMARILY USED FOR PRIMARY POWER DISTRIBUTION FROM THE GENERATORS TO THE MAIN DISTRIBUTION PANELS, THE WEIGHT INCREASE TO THE ELECTRICAL INTERCONNECT SYSTEM IS CONSIDERED INSIGNIFICANT. SINCE THIS CHANGE DOES AFFECT THE MAXIMUM WEIGHT LIMITS FOR SIZES 8 THROUGH 4/0, END USERS SHOULD VERIFY THAT THE NEW WEIGHT RANGES MEET THE DESIGN REQUIREMENTS OF LEGACY APPLICATIONS. CORRECTED STATE OF SINTER REQUIREMENT.

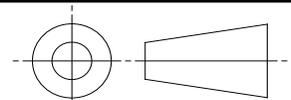
AS22759/188B HAS BEEN REAFFIRMED TO COMPLY WITH THE SAE FIVE-YEAR REVIEW POLICY.

NOTICE

THE COMPLETE REQUIREMENTS FOR PROCURING THE PRODUCT DESCRIBED HEREIN SHALL CONSIST OF THIS DOCUMENT AND THE LATEST ISSUE OF AS22759.

For more information on this standard, visit  
<https://www.sae.org/standards/content/AS22759/188B/>

THIRD ANGLE PROJECTION



CUSTODIAN: AE-8/AE-8D

PROCUREMENT SPECIFICATION: NONE



**AEROSPACE STANDARD**

(R) WIRE, ELECTRICAL, POLYTETRAFLUOROETHYLENE/  
 POLYIMIDE INSULATED, SMOOTH SURFACE, NORMAL  
 WEIGHT, TIN-COATED COPPER CONDUCTOR,  
 150 °C, 600 VOLTS ROHS

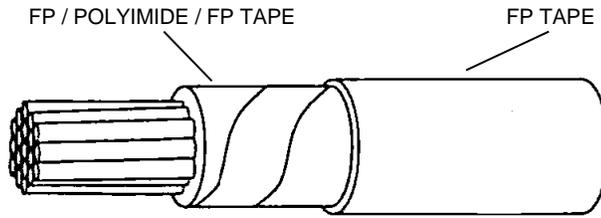
**AS22759™/188**  
 SHEET 1 OF 6

**REV. B**

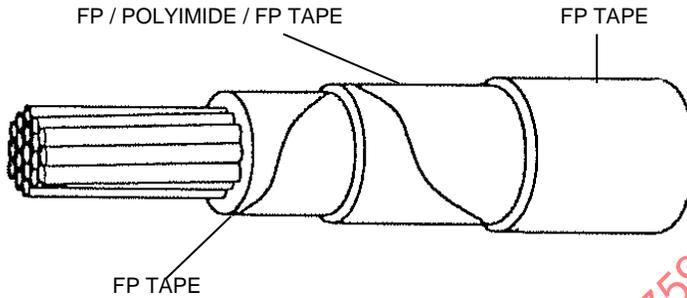
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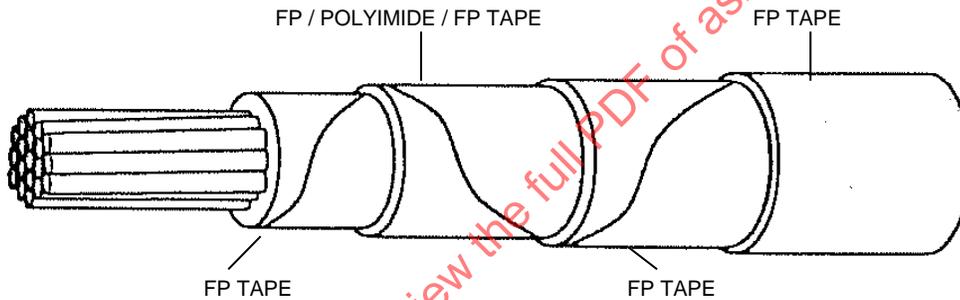
ISSUED 2010-02 REVISED 2017-09 REAFFIRMED 2022-07



SIZE 26 THROUGH 10



SIZE 8 THROUGH 6



SIZE 4 THROUGH 04

FP – FLUOROCARBON POLYMER MODIFIED POLYTETRAFLUOROETHYLENE (PTFE)  
CONDUCTOR – STRANDED TIN COATED COPPER

FIGURE 1 - AS22759/188 CONFIGURATION

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	<b>AEROSPACE STANDARD</b>	<b>AS22759™/188</b> SHEET 2 OF 6	<b>REV.</b> <b>B</b>
	<small>(R) WIRE, ELECTRICAL, POLYTETRAFLUOROETHYLENE/ POLYIMIDE INSULATED, SMOOTH SURFACE, NORMAL WEIGHT, TIN-COATED COPPER CONDUCTOR, 150 °C, 600 VOLTS ROHS</small>		

**TABLE 1 - CONSTRUCTION DETAILS**

PART NO. <u>1/</u>	WIRE SIZE	CONDUCTOR <u>4/</u>				FINISHED WIRE <u>3/</u>				
		STRANDING (NUMBER OF STRANDS X SIZE GAUGE OF STRANDS)	DIAMETER (INCH)		RESISTANCE AT 20 °C (68 °F) (OHMS/1000 FT. MAX.)	DIAMETER (INCH)		WEIGHT (LB/1000 FT.) <u>2/</u>		
			MIN.	MAX.		MIN.	MAX.	MIN.	TARGET	MAX.
M22759/188-26-*	26	19 X 38	.0175	.0204	41.3	.033	.037	1.29	1.42	1.55
M22759/188-24-*	24	19 X 36	.0225	.0244	26.2	.038	.042	1.87	2.04	2.20
M22759/188-22-*	22	19 X 34	.0285	.0314	16.2	.043	.047	2.70	2.90	3.10
M22759/188-20-*	20	19 X 32	.0365	.0394	9.88	.051	.055	4.25	4.45	4.65
M22759/188-18-*	18	19 X 30	.0455	.0494	6.23	.061	.065	6.35	6.60	6.85
M22759/188-16-*	16	19 X 29	.0515	.0554	4.81	.068	.073	8.10	8.40	8.70
M22759/188-14-*	14	19 X 27	.0645	.0694	3.06	.081	.086	12.3	12.3	13.3
M22759/188-12-*	12	37 X 28	.0835	.0894	2.02	.100	.105	19.1	19.1	20.2
M22759/188-10-*	10	37 X 26	.106	.112	1.26	.122	.127	30.3	30.8	32.2
M22759/188-8-*	8	133 X 29	.158	.169	.701	.180	.188	55.9	57.8	59.7
M22759/188-6-*	6	133 X 27	.198	.212	.445	.219	.229	86.9	89.4	91.9
M22759/188-4-*	4	133 X 25	.250	.268	.280	.276	.288	141	145	149
M22759/188-2-*	2	665 X 30	.320	.340	.183	.344	.364	217	225	233
M22759/188-1-*	1	817 X 30	.360	.380	.149	.388	.408	265	274	283
M22759/188-01-*	0	1045 X 30	.395	.425	.116	.420	.450	335	349	363
M22759/188-02-*	00	1330 X 30	.440	.475	.091	.475	.505	419	438	457
M22759/188-03-*	000	1665 X 30	.500	.540	.071	.530	.560	528	548	568
M22759/188-04-*	0000	2109 X 30	.565	.605	.056	.590	.630	676	698	720

- 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. M22759/188-20-93 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.
- 4/ CONDUCTOR SHALL CONFORM TO AS29606 TYPE TCC SMALL DIAMETER TIN COATED COPPER CONDUCTOR FOR WIRE SIZES 26 THROUGH 4 AND GENERAL PURPOSE FOR WIRE SIZES 2 THROUGH 0000.

REQUIREMENT: 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, TABLE 1, 2, 3, AND 4.

**TABLE 2 - WIRE INSULATION MATERIAL**

TAPE CODE	THICKNESS (NOM.)	MATERIAL
1	.0020	.0005 (FP)/.0010 (POLYIMIDE)/.0005 (FP)
2	.0010	FP (SKIVED)
3	.0020	FP (SKIVED)
4	.0020	FP (UNSINTERED)
5	.0025	FP (UNSINTERED)
6	.0030	FP (UNSINTERED)

**TABLE 3 - 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.										
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	55.9	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 THE INNERMOST TAPE WHICH IS IN CONTACT WITH THE CONDUCTOR. WRAPS 2, 3, AND 4 ARE PROGRESSIVELY FURTHER AWAY FROM THE CONDUCTOR CORE.

2. WIRE PERFORMANCE RATING

TEMPERATURE RATING: 150 °C (302 °F) MAXIMUM CONDUCTOR CONTINUOUS TEMPERATURE.

VOLTAGE RATING: 600 VOLTS (RMS) AT SEA LEVEL. THIS INSULATION SYSTEM HAS BEEN USED IN AEROSPACE APPLICATIONS USING 115 VOLTS (PHASE TO NEUTRAL), 400 HERTZ AC AND 28 VOLTS DC. VERIFICATION OF THE SUITABILITY OF THIS PRODUCT FOR USE IN OTHER ELECTRICAL SYSTEM CONFIGURATIONS IS THE RESPONSIBILITY OF THE USER.

3. MATERIALS AND PHYSICAL PROPERTIES

SEE 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. FINISH WIRE INSULATION PROPERTIES

FINISH WIRE INSULATION PROPERTIES SHALL BE IN ACCORDANCE WITH TABLE 4.