# Amphenol SOCAPEX



# **Powersafe**

Qualified VG96944

Derived from MIL-DTL-38999 Series III/EN3645









#### ABOUT AMPHENOL SOCAPEX



## Proven excellence in interconnect solutions

Since 1947, Amphenol Socapex has prescribed, designed and manufactured reliable and innovative interconnection solutions for harsh environments, specializing in standard and customized electrical and fiber optic connectors, contacts, accessories and cabling solutions.

Located in the **Mont Blanc** region of France and Pune in India, Amphenol Socapex has a presence in over 100 countries around the world.

Amphenol Socapex is part of the international **Amphenol Corporation**.



1000+ employees



Net Sales 2019: 86,6 M€ 69% Export - 31% France



Two facilities: Thyez (France), Pune (India)

## :1947



- Socapex creation in Suresnes, France
- 1st radio connector

## 1956-57



- Manufacturing unit in Cluses (74)
- Thomson-CSF becomes primary shareholder

#### **Early 1960's**



- 1st board level connectors: HE8 - 1st "licence Bendix" manufactured

#### 1973



- New factory 13 000 m<sup>2</sup> in Thyez (74) France with 250 people

#### 1975



- Production of 38999 connectors

**Fiber optics** 

#### 2014-2017







- New Cable Assembly workshop
- New Contact Manufacturing workshop

#### Today and tomorrow | New technologies



High-speed signals

**Miniaturization** 

**Rugged Ethernet** 

Power

**ROHS** solutions

Advanced Materials (composite)

#### INTERNATIONAL EXPERTISE



# Our expertise has no boundaries

## **Integrated Production in France & India**

- 24 000 m<sup>2</sup> manufacturing capacity on 2 sites
- Design centers in France and India
- State-of-the-art manufacturing technology



## **Our markets**



Communication Systems - Radios - C4ISR / Ground vehicles - Vetronics / Marine / Missiles



Commercial & military / Avionics / Engines / Landing gear / Actuators



## Today and tomorrow | Sustainable development



## Respect for nature and the environment

of natural resources Optimization of natural resources
Recycling Goodwill

Optimization of natural resources

Waste Management

## PRODUCING FASTER, SMALLER, STRONGER CONNECTORS...



## **Technologies & innovation**



**Engineering Laboratory for product** testing and qualification, product expertise and metrology

- Mechanical and electrical skills
- RF and fiber optics expertise



Strong expertise in high-speed signals

- 3D EM simulation software & EM models
- Time Domain and frequency domain (VNA 20GHz, TDR and eye diagram)



Focus on materials expertise and manufacturing techniques to produce faster, smaller and stronger products

- 3D CAD mechanical software, simulation
- Disruptive metal alloys, additive manufacturing



Sustainable environment approach, with pro-active management of regulations (REACH / RoHS / Conflict minerals...)

- New materials development, plating, and suitable processes
- Recycling and rational resources consumption

## **Our workshops**

Our workshops located in France & India provide consistent quality adapted to your volume requirements.

Tooling: Tools for our different activities: molding, machining, assembly Molding: Solid expertise in thermoplastic elastomer and thermoset molding

Machining: Manufacturing of cylindrical shells from 10 to 90 mm in diameter and rectangular shells

Screw Machining: Cylindrical production parts up to 10 mm in diameter

Plating: Plating with cadmium, nickel, electroless nickel, silver, black zinc nickel, gold

Assembly: Connector and harness assembly (electrical & optical)

## Our certifications











Product certifications: MIL-DTL38999, EN3645, EN3155, VG

## Our memberships











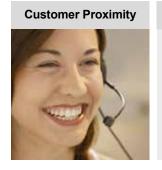
Member of CMG (Connecting Manufacturing Group) Consortium

#### **DELIVERING GREAT CUSTOMER EXPERIENCE**



▶ We have a strong reputation for helping customers solve their toughest challenges. This approach of serving your needs is ingrained in our company – from our sales team to our product development engineers.

## A partner you can trust











## **Buy our solutions**

You can access our solutions through our global network of sales offices or through our distributors.

#### Field Sales Team:

12 in France

15 in Europe

4 100+ in North America and rest of the world.

5 Business Development Managers supporting local sales force Europe, North America and the rest of the world

Technical Support & Multilingual Customer Service : 15 people

#### **Worldwide Distribution Network:**

Including qualified distributors (QPL approved) for assembling : MIL-DTL-38999, PT/451/VG95328 & Fiber Optics connectors



#### **POWERSAFE**

**PowerSafe** MIL-DTL-38999 Series III was developed to transfer high power (500V voltage) in harsh environment, with a full safety for the user.

#### **Main Features**

- Oualified VG96944
- Focus both on USER SAFETY and on the MIL-DTL-38999 Series III performances
- First mate/last break: One protective contact linked to the shell
- Last mate/first break: One pilot contact with breaking capacity. It allows the current flow in the phase and neutral contacts through a relay
- IP28:
- finger test for socket contacts and socket inserts
- pressure water tight (48h, under 2m water)



#### **Added Benefits**

- In accordance with the new standard for power equipment
- Homogeneity with standard MIL-DTL-38999 III connectors when power is needed on the equipment (same panel drilling)
- Qualified according the most stringent standard VG96944
- Safety use design following DIN EN-61984 (VDE 0627)

### **Markets & Applications**

#### **Markets**

- Defense: C4ISR/Battlefield/Ground Vehicles/Missile
- Avionics
- Harsh industrial markets

## **Applications**

- I/O Power for boxes
- Power connectors spread on the field (drums)
- Electrical power generator



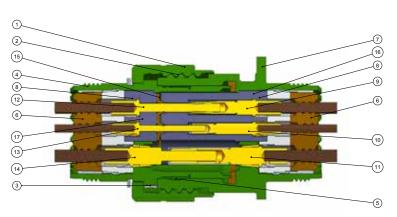




## **POWERSAFE - MECHANICAL CHARACTERISTICS**

- 1 Coupling nut
- 2 Quick coupling thread
- 3 Anti-decoupling device
- 4 Plug shell
- 5 Spring fingers (EMI)
- 6 Grommet
- 7 Receptacle shell
- 8 Contact retention clips
- 9 Phase and neutral socket contact

- 10 Pilot socket contact
- (11) Protective socket contact
- (12) Phase and neutral pin contact
- (13) Pilot pin contact
- (14) Protective pin contact
- (15) Interfacial seal
- (16) Socket insert
- (17) Pin insert



	MIL-DTL-38999 series III	VG96944			
Durability	500 cycles	500 cycles			
Shell Size	13/17/25 (3 arrangements)	13/17/25 (3 arrangements)			
Shock	-	Half-sine, 500 m/s2, 11 ms			
Sine vibrations	60g from -55 +175°C (ODC) + 200°C (nickel)	-			
Random vibrations per EIA364.28 vs VG95319-2	-	Spectrum 5 Hz to 500 Hz			
Shell and Backshell plating	Olive Drab Cadmium, Black Zinc Nickel, Electroless nickel, Bronze, Inox	Olive Drab Cadmium			
Insert material	Thermoplastic insert Silicone rubber grommet and interfacial seal	Thermoplastic insert with Comparative Tracking Index < 400 V Silicone rubber grommet and interfacial seal			
Contacts	Crimp, removable contacts Gold plating for pilot contact and silver plating for protective, phase and neutral contacts	Crimp, removable contacts Gold plating for pilot contact and silver plating for protective, phase and neutral contacts			
Protective contact resistance	≤100 mΩ	≤100 mΩ			

#### **Contact retention force:**

Contact Size	20	16	12	6
Maximum load (N)	67	111	111	111

## **Environmental Characteristics**

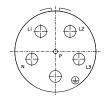
	MIL-DTL-38999 series III	VG96944
Temperature	-65 +175°C (ODC, BZN platings) -65 + 200°C (Nickel plating, bronze, stainless steel)	-65 +150°C (ODC plating)
Salt spray exposure	48h for Nickel 500h for Olive Drab Cadmium, Black Zinc Nickel, Bronze and strainless steel	Test level 2:5% NaCl, 2h salt fog exposure, 22h storage in humid air, 5 cycles
Sealing	IP28 : - finger test for socket contacts and socket inserts - pressure water tight (48h, under 2m water)	IP28 : - finger test for socket contacts and socket inserts - pressure water tight (48h, under 2m water)



#### **Insert Arrangements**







VG designation	13-V4	17-V6	25-V6
TV designation	13-E4	17-E6	25-E6
Pilot contact	1 Size 20	1 Size 16	1 Size 16
Phase & neutral	2 Size 16	4 Size 12	4 Size 6
Protective contact	1 Size 16	1 Size 12	1 Size 6

Other platforms in development. Please consult us.

#### **Electrical Characteristics**

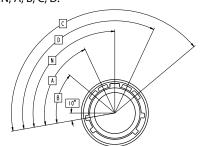
	Pilot o	ontact	Phase, neutral and		
Arrangements	Contact rating	Operating Voltage AC or DC	Contact rating	Operating Voltage AC or DC	Test voltage AC
13-V4 / 13-E4	0,5 A	60 V	16 A	250 V	1500 V
17-V6 / 17-E6	0,5 A	60 V	25 A	500 V	2500 V
25-V6 / 25-E6	0,5 A	60 V	63 A	500 V	2500 V

Note: test voltage in mated condition, unmated condition for pilot socket contact only

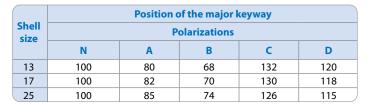
#### **Polarization**

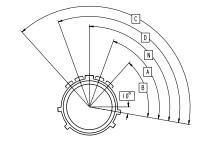
To avoid cross-plugging problems in applications requiring the use of more than one PowerSafe connector of the same size, alternate key-rotations are available as indicated in the chart aside. As shown in the accompanying diagram, the major key rotates clockwise from the secondary ones.

In the reference system, the polarization is shown by the letters N, A, B, C, D.



Receptacle - Front face shown



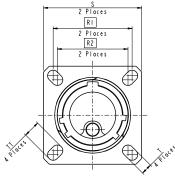


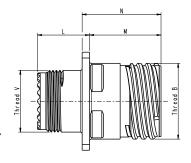
Plug - Front face shown

### **Overall Dimensions**

#### Square flange receptacle

VG96944-04A TVP00RW TVP00ZN TVPS00RF TVPS00RB TVPS00RK





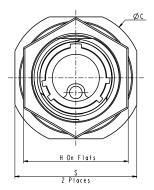


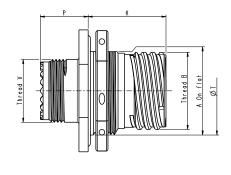
Shell size	B thread Class 2A .1P3L-TS (inches)	L Max (mm)	M Max (mm)	N +0.13 0 (mm)	R1 (mm)	R2 (mm)	S ±0.3 (mm)	T ±0.2 (mm)	TT ±0.2 (mm)	V thread (metric)
13	.875	15.5	20.9	22.99	23.01	20.62	28.6	3.25	4.93	M18x1-6g
17	1.1875	15.6	23.4	25.49	26.97	24.61	33.3	3.25	4.93	M25x1-6g
25	1.625	20.7	24.6	27.49	38.10	34.93	46.0	3.91	6.15	M37x1-6g



#### Jam nut receptacle

VG96944-04B TV07RW TV07ZN TVS07RF TVS07RB TVS07RK



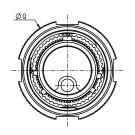


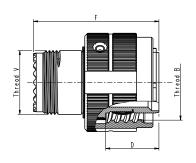


Shell size	B thread Class 2A .1P3L-TS (inches)	A +0.1 -0.15 (mm)	C Max (mm)	K Max (mm)	P Max (mm)	H Hex 0 -0.1 (mm)	S +/-0.4 (mm)	T (mm)	V thread (metric)	Hex nut max torque (N.m)
13	.875	23.82	38.4	22.5	13.7	30	34.9	25.2 - 25.5	M18x1-6g	6.8
17	1.1875	30.15	44.8	25.0	14.1	36	41.3	31.8-31.95	M25x1-6g	9.6
25	1.625	42.85	59.0	27.0	18.5	50	55.6	44.2 - 44.5	M37x1-6g	14.7

## **Straight plug**

VG96944-04C TV06RW TV06ZN TVS06RF TVS06RB TVS06RK





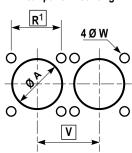


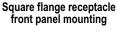
Shell size	B thread Class 2B .1P3L-TS (inches)	Q Max (mm)	F Max (mm)	D (mm)	V thread (metric)
13	.875	29.4	35.5	15.01	M18x1-6g
17	1.1875	35.7	38.0	17.51	M25x1-6g
25	1.625	48.0	46.0	19.51	M37x1-6g

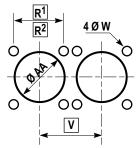
<sup>\*</sup> Conforms to CECC 75.201.002 (coupling nut for arctic gloves)

## Panel drilling for receptacles

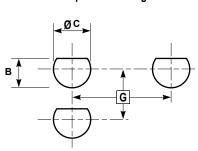
# Square flange receptacle rear panel mounting







# Jam nut receptacle rear panel mounting



Shell size	R¹ (mm)	R <sup>2</sup> (mm)	V Mini (mm)	ØA Min (mm)	ØAA Min (mm)	ØW ±0.13 (mm)	G Mini (mm)	ØC +0.25 0 (mm)	B 0 -0.25 (mm)
13	23.01	20.62	30.20	23.42	19.05	3.25	36.00	25.65	24.26
17	26.97	24.61	36.50	30.96	25.81	3.25	43.30	32.01	30.73
25	38.10	34.93	48.80	42.47	37.69	3.81	59.70	44.70	43.43

#### PROTECTIVE CAPS

## **Description**

The largest range of protective caps with IP68 protection level.

#### Main features

- Compatible with Plugs, Jam nut and Square receptacles
   IP 68 (permanent sealing)
   Protection again dust, water and moisture

- EMI function
- Nylon cord, stainless steel rope or metallic chain



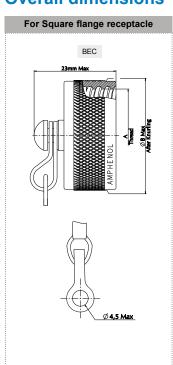


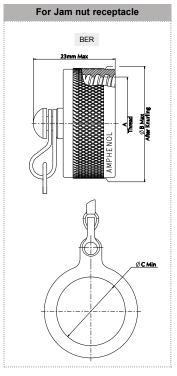


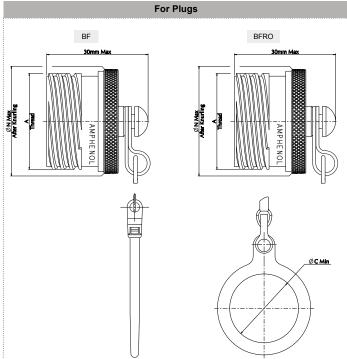




#### **Overall dimensions**







Lanyard (Attachment) Length

Cap type	Metallic chain length	Nylon cord length	Stainless steel rope length			
BEC/BER for receptacle	127 (+13,-7)					
BF/BFRO for plug	160±5					

Shell size	A thread .1P3L-TS Class 2A (External) Class 2B (Internal) (inches)	ØB Max (After Knurling)	ØC Min	ØN Max
13	.8750	25,75	25,15	24,30
17	1.1875	33,80	32,00	30,60
25	1.6250	44,90	44,45	42,80

Standard Metallic Caps	В	EC	N	TV	W	13
Protection cap type EC: For square flange receptacle ER: For jam nut receptacle F: For plug						
Wire type Blank for metallic chain N: Nylon cord R: Jacketed stainless steel rope RO: Jacketed stainless steel rope with ri	ing (only for pl	ug)				
Connector type						
Material and finish W: Olive drab cadmium plated on alumir ZN: Black zinc nickel plated on aluminiu F: Electroless nickel plated on aluminiun B: Marine bronze (200°C)	m (175°C) 🗸					
Corresponding connector shell size 13/17/25						

For other platings, please consult us - Example: Olive Drab Cadmium Cap with Nylon Cord for Square Flange receptacle size 17: BECNTVW17

✓: RoHS compliant

## **BACKSHELLS**

- Compatible with AS85049 suitable for MIL-DTL-38999 Series III connectors
- For VG96944 versions:



Shell size	Backshell from AALBGmbh or EMCA	Shrink boot	Adhesive	Micro Clamping Band	or S	tandard Clamping Band	Tool for Micro Band	Tool for Standard Band
13	VG95319-1011G012A	VG95343T06B001A	VG95343T15A001	895693				
17	VG95319-1011G005A	VG95343106B001A				072952	809985	809952
25	VG95319-1011G010A	VG95343T06C001A		895700				J

IMPORTANT: Use Shrink Boots 202K121-12 (size 13), 202K132-12 (size 17), 202K153-12 (size 25) and Adhesive S1255 for MIL applications

• Other backshells for shielding:

SHIELDING	
	TV-35: BAND BACKSHELL FOR SHIELDING  • Full 360° shield termination  • Available with different cabling chambers  • Easy maintenance or repairability  • Sealing ensured by straight or right angled heat-shrink molded piece  • Right angle version: TV SBC
ann and a second	TV NSA: HIGH LEVEL OF EMI/RFI PROTECTION  • Electrical continuity between cable and connector by clamping the braid with a screwing system  • Free inner ring to avoid twisting of the braid when screwing  • Sealing ensured by straight or right angle heat-shrink molded piece

## How to Order How to order VG 96944 reference

Series	VG96944-04	Α	13-V4	Р	N	Α
VG96944-04						
Shell type A: Square Flange Receptacle B: Jam Nut Receptacle C: Straight plug						
<b>Shell size</b> 13-V4 / 17-V6 / 25-V6						
Contact type P: Pin S: Socket						
Polarization N for Neutral, A, B, C, D						
Material and Plating A: Olive Drab Cadmium on Aluminium						

## **How to order TV reference**

Series	TV	P00	RW	13-E4	Р	-
TV						
Shell type P00: Square flange receptacle: 175°C (olive drab cadmium, black zinc nickel) PS00: Square flange receptacle: 200°C (nickel, stainless steel, bronze) 07: Jam nut receptacle: 175°C (olive drab cadmium, black zinc nickel) S07: Jam nut receptacle: 200°C (nickel, stainless steel, bronze) 06: Straight plug: 175°C (olive drab cadmium, black zinc nickel) S06: Straight plug: 200°C (nickel, stainless steel, bronze)						
Material and Plating RW: olive drab cadmium on aluminium ZN: black zinc nickel on aluminium RF: electroless nickel on aluminium RK: passivated stainless steel RB: marine bronze						
<b>Shell size</b> 13-E4 / 17-E6 / 25-E6						
Contact type P: Pin S: Socket						
Polarization Blank for neutral, A, B, C, D						

**√**: RoHS compliant

## **CONTACTS AND TOOLS**

	TOOLS FOR VG 96944 / POWERSAFE CONNECTORS																	
			Cor	ntacts		Wires			Crim		mping tools	mning tools Ins		Insertion tools		Re	Removal tools	
Arrangement	Contact type	Size	Proprietary	Part Number	AWG	Section mm <sup>2</sup>		over lator	Wire stripping		mping tools		Plastic		letallic	Plastic		etallic
	type		Pin	Socket			Min	Max	length	Tools		Selector position	color	Straight type	Angle type	color	Straight type	Angle type
	Pilot	20	600665	600892	20 22 24	0,61 0,38 0,24	1,02	2,11				3 2 1	M81969/14-10 red / orange	809817	M81969/8-05	M81969/14-10 red / orange	809847	M81969/8-06
13-V4 13-E4	Phase Neutral	16	600666	600676	14 16	1,94 1,23	1,65	2,77	6 (+0.5)	M22520/1-01	M22520/1-04	6	M81969/14-03 blue / white		M81969/8-07	M81969/14-03 blue / white	809846	M81969/8-08
	Protective		600667	600677	18 20	0,96 0,61				5 4	_	/			/			
17-V6	Pilot	16	600660	600894	16 18 20	1,23 0,96 0,61	1,65	2,77				6 5 4	M81969/14-03 blue / white	809816	M81969/8-07	M81969/14-03 blue / white	809846	M81969/8-08
17-V6 17-E6	Phase Neutral	12	600661	600671	12 14	2,98 1,94	2,46	3,61	6 (+0.5)	M22520/1-01	M22520/1-04	8 7	M81969/14-04 yellow / white	809824	M81969/8-09	M81969/14-04 yellow / white	809850	M81969/8-10
	Protective		600662	600672	'-	1,54						′	/			/		
	Pilot	16	600660	600894	16 18 20	1,23 0,96 0,61	1,65	2,77	6 (+0.5)	M22520/1-01	M22520/1-04	6 5 4	M81969/14-03 blue / white	/	/	M81969/14-03 blue / white	/	/
25-V6	Phase Neutral		600663	600673						809947 + 8099	908 (hex crimp) or							
25-E6	Protective	6	600664	600674	6	13,61	7,3	8,1	14 (+1.5)	M22520/23-01 + M22520/23-03	809697 (pin) 809690 (socket)	/	/	/	/	/	/	809696

## **Crimping tools**

MANUAL CRIMPING PLIERS M22520/1-01



HYDRAULIC PLIERS 809947



PNEUMATIC PLIERS M22520/23-01



## **QUALIFIED CABLES FOR VG96944**

Size 13	PN	Raw material
WIRE AWG19 white	VG95218T020A003	TINNED copper, jacket PVF modified
WIRE AWG14 blue	M81044/12-14-6	TINNED copper, jacket PVDF
WIRE AWG14 white	M81044/12-14-9	TINNED copper, jacket PVDF
WIRE AWG14 green yellow	M81044/12-14-45	TINNED copper, jacket PVDF
Fillers	/	PTFE
Braid	TB13-T-63	TINNED copper
Heatshrink	DR25 3/8-0M (VG95343 Part 5 Type D)	ELASTOMER

Size 17	PN	Raw material
WIRE AWG19 white	VG95218T020A003	TINNED copper, jacket PVF modified
WIRE AWG12 white	VG95218T020A017	TINNED copper, jacket PVF modified
WIRE AWG12 blue	M81044/12-12-6	TINNED copper, jacket PVDF
WIRE AWG12 green yellow	M81044/12-12-45	TINNED copper, jacket PVDF
Fillers	/	PTFE
Braid	TB13-T-695	TINNED copper
Heatshrink	DR25 1/2-0M (VG95343 Part 5 Type D)	ELASTOMER

Size 25	PN	Raw material
WIRE AWG19 white	VG95218T020A003	TINNED copper, jacket PVF modified
WIRE AWG6 white	M22759/16 6-9	TINNED copper, jacket PVDF
WIRE AWG6 blue	M22759/16 6-6	TINNED copper, jacket PVDF
WIRE AWG6 green yellow	M22759/16 6-4/5	TINNED copper, jacket PVDF
Fillers	/	PTFE
Braid	TB13-T-200	TINNED copper
Heatshrink	DR25 1-0M (VG95343 Part 5 Type D)	ELASTOMER

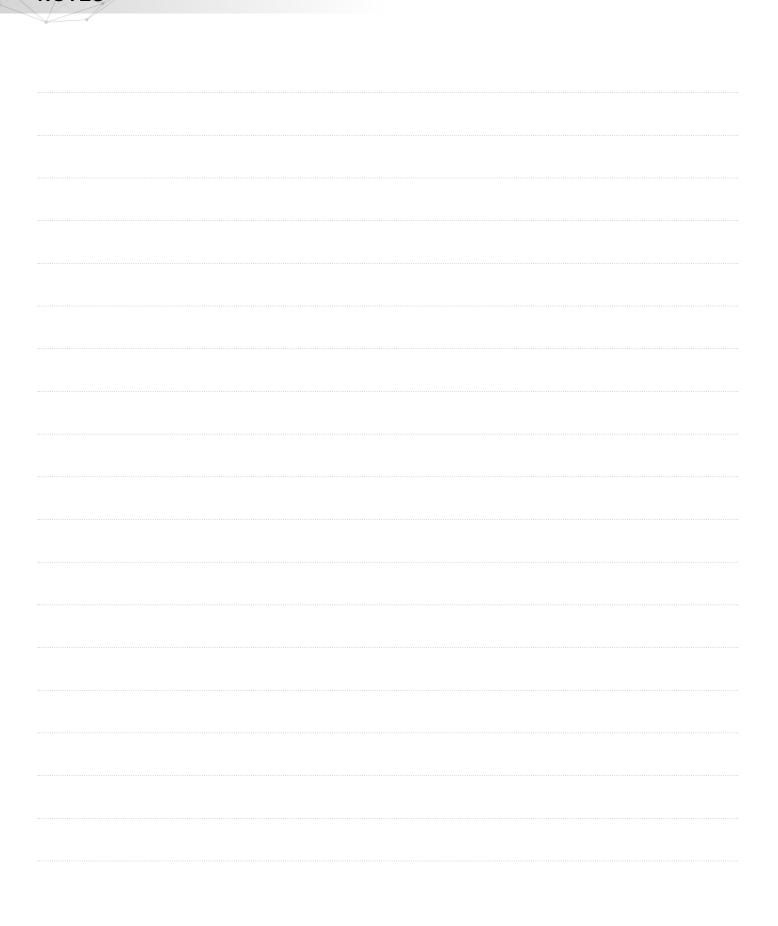
## **Qualified cables for MIL applications**

Size 13	PN	Raw material
WIRE AWG20	M22759/34 20	TINNED copper, jacket ETFE
WIRE AWG14	M22759/34 14	TINNED copper, jacket ETFE
Fillers	/	PTFE
Braid	4D045558	Nickel copper
Heatshrink	RW200E-1/2-0 or HLR33001270	Fluroelastomeric or Viton

Size 17	PN	Raw material
WIRE AWG19	M22759/34 16	TINNED copper, jacket ETFE
WIRE AWG12	M22759/34 12	TINNED copper, jacket ETFE
Fillers	/	PTFE
Braid	4D047547	Nickel copper
Heatshrink	RW200E-3/4-0 or HLR33001900	Fluroelastomeric or Viton

Size 13	PN	Raw material
WIRE AWG19	M22759/34 16	TINNED copper, jacket ETFE
WIRE AWG6	M22759/34 6	TINNED copper, jacket ETFE
Fillers	/	PTFE
Braid	4D045591	Nickel copper
Heatshrink	RW200E-1 1/2-0 or HLR33003810	Fluroelastomeric or Viton

# NOTES



## **ABOUT AMPHENOL**

Founded in 1932, **Amphenol** is one of the largest manufacturers of interconnect products in the world. The company designs, manufactures, and markets electrical, electronic, and fiber optic connectors, interconnect systems, and coaxial and specialty cables.

**Amphenol** has a diversified presence as a leader in high growth areas of the interconnect industry and provides solutions for customers in the automotive, broadband, industrial, information technology and data communications, military and aerospace, mobile devices, and mobile networks markets.

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**Amphenol Military & Aerospace Operations** (AMAO) has the largest and broadest selection of interconnect products in the military and aerospace markets.

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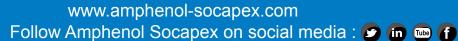
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