

# MIL-DTL-38999 Series II Electric Circular Connector

## 1. Main Features

- Compliance with MIL-DTL-38999 Series II standards;
- Quick bayonet coupling;
- Small size, lightweight, and shortest shell length;
- EMI/RFI shielding: Ensures superior electromagnetic interference and radio frequency interference protection.
- Crimp-removable contacts: Allows for easy contact replacement without requiring special tools.
- Receptacles: Available in a variety of mounting styles including box-mount, surface-mount, front-mount, rear-mount, and nut-mounted.
- Lightweight design: Ideal for applications where weight and size are critical and where exposure to severe vibration, sand, or moisture is limited.
- Sealed interface and tail: Provides excellent environmental sealing for moisture, dust, and other contaminants.
- Widely used in: Aerospace, aviation, and military systems.

## 2. Key technical characteristics

### 2.1 Mechanical Characteristics

Shell Materials:	Aluminum alloy, stainless steel
Shell Finishes:	Class B: Olive drab cadmium; Class E: Passivated stainless steel; Class F: Electroless nickel
Insulator Material:	Thermosetting Plastic
Grommets and Seals Material:	Silicone rubber
Contacts:	Gold-plated copper alloy, crimp, solder, and PCB types
Mechanical Life:	≥500 mating cycles
Shock:	3ms half-sine wave, peak acceleration of 300g

### 2.2 Environmental Characteristics

Operating Temperature:	Class B: -65°C to +175°C; Class E & F: -65°C to +200°C
Salt Spray Resistance:	Tested according to GJB1217 Method 1001: Class B: 500 hours; Class E: 1000 hours; Class F: 48 hours
Relative Humidity:	98% at 40°C
Operating Altitude:	≤ 30,480 meters
Additional Features:	Excellent resistance to moisture, salt spray, fungus, rain, and dust.

## 2.3 Electrical Characteristics

### 2.3.1 Contact Resistance and Current Rating:

Contact Size	Diameter (mm)	Contact Resistance (mΩ)	Current Rating (A)
22D#	Φ076	≤12	5
20#	Φ1.00	≤5	7.5
16#	Φ1.60	≤2.5	13
12#	Φ2.40	≤1.5	23

### 2.3.2 Electromagnetic Interference Shielding:

- Minimum attenuation of 45 dB from 100 MHz to 1 GHz.

### 2.3.3 Withstanding Voltage (V):

Ratings*	M	I	II
sea level	1300	1800	2300
21000m	800	1000	1000

\* Working voltage varies depending on the contact arrangement. Please refer to the contact arrangement for details.

### 2.3.4 Insulation Resistance:

- ≥ 5000 MΩ under normal conditions
- ≥ 100 MΩ under humid conditions

### 2.3.5 Shell Continuity:

- ≤ 2.5 mΩ for Class B, ≤ 1.0 mΩ for Class F, and ≤ 5 mΩ for Class E.

### 3. How to Order

	<b>MS</b>	<b>27472</b>	<b>T</b>	<b>14</b>	<b>F</b>	<b>35</b>	<b>P</b>	<b>N</b>
Series:	<b>MS</b>							
MS Number:	<b>27473</b> - Crimp Straight Plug (T-type only) <b>27484</b> - Crimp Straight Plug with Grounding Fingers (T-type only) <b>27472</b> - Crimp Wall Mounting Flange Receptacle (T-type only) <b>27513</b> - Crimp Box Mounting Flange Receptacle with grommet (E-type only) <b>27497</b> - Crimp Wall Mounting Flange Receptacle (Rear mount) (T-type only) <b>27508</b> - Crimp Box Mounting Flange Receptacle (Rear mount) (E-type only) <b>27474</b> - Crimp Jam Nut Receptacle (T-type only)							
Service Class:	<b>T</b> - Threaded rear for accessory mounting; <b>E</b> - Non-threaded rear, no accessory mounting							
Shell Size:	<b>08, 10, 12, 14, 16, 18, 20, 22, 24</b>							
Finishes:	<b>B</b> - Olive drab cadmium plate nickel base 175°C <b>C</b> - Anodic coating (Alumilite) 200°C <b>F</b> - Electroless nickel 200°C <b>E</b> - Passivated steel 200°C							
Insert Arrangement:	See "Insert Arrangement" Table (Page 5-6)							
Contact Style:	<b>P</b> - Crimp pin; <b>PH</b> - Solder pin; <b>PL</b> - Long printed circuit pin; <b>PC</b> - Short printed circuit pin; <b>S</b> - Crimp socket; <b>SH</b> - Solder socket; <b>SL</b> - Long printed circuit socket; <b>SC</b> - Short printed circuit socket							
Alternate Keying Position:	<b>N</b> - Normal keyway; <b>A, B, C, D</b> - Variant keyways							

Note:

1. For applications requiring high oil resistance, the connector seal material shall be fluorosilicone rubber. Add "C1" to the end of the original part number. For example, MS27467T17F35PNC1.
2. If a conductive square gasket is required, add "C2" to the end of the part number. For example, MS27466T17F35PNC2.
3. If a conductive O-ring is required, add "C5" to the end of the part number. For example, MS27468T17F35PNC5.

## 4. Crimp Contacts

Contact Size	Diameter (Mm)	Pin Color Code	Socket Color Code	Ferrule Inner Diameter (mm)	Ferrule Outer Diameter (mm)	Suitable Wire Cross-section (mm <sup>2</sup> )	Suitable Wire AWG	Suitable Wire Insulation Outer Diameter (mm)	Removal Tool Code
22D#	0.76	Orange - Blue - Black	Orange - Yellow - Grey	0.85	1.20	0.08 0.125 0.2 0.3	28 26 24 22	0.76 ~ 1.37	M81969/ 14-01
20#	1.00	Orange - Blue - Orange	Orange - Green - Brown	1.17	1.78	0.2 0.3 0.5	24 22 20	1.02 ~ 2.11	M81969/ 14-10
16#	1.60	Orange - Blue - Yellow	Orange - Green - Red	1.68	2.62	0.5 0.8 1.0 1.2	20  18 16	1.65 ~ 2.77	M81969/ 14-03
12#	2.40	Orange - Blue - Green	Orange - Green - Orange	2.49	3.84	2.0 3.0	14 12	2.46 ~ 3.61	M81969/ 14-04

# 5. Insert Arrangement

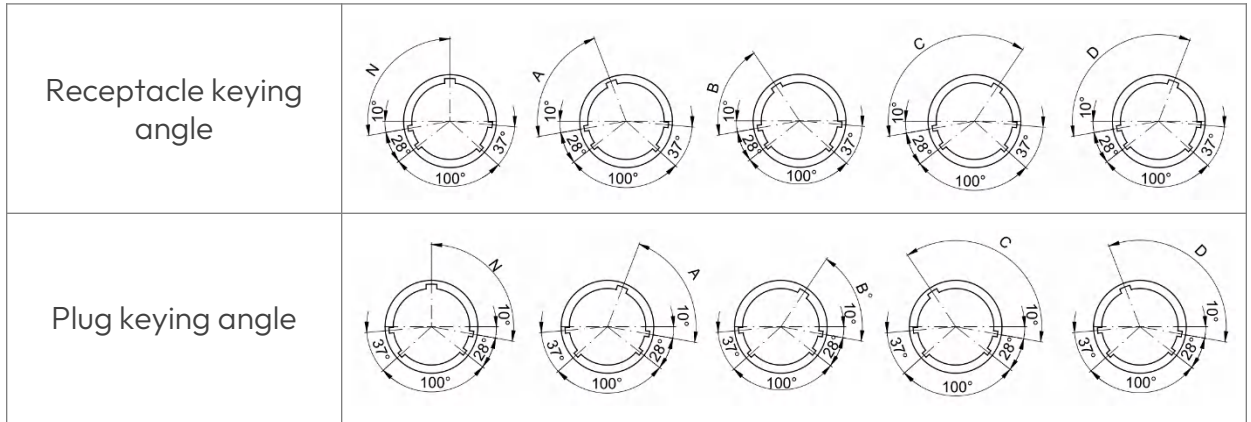
Shell Sizes <b>08</b>	35 M  6-22D#	98 I  3-20#	02 I  2-20#	03 I  3-20#	10 I  1-12#	11 I  1-16#	
<b>10</b>	35 M  13-22D#	98 I  6-20#	05 I  5-20#	04 I  4-20#	01 I  1-12#	99 I  7-20#	02 I  2-16#
<b>12</b>	35 M  22-22D#	98 I  10-20#	04 I  4-16#	08 I  8-20#	03 II  3-16#		
<b>14</b>	35 M  37-22D#	18 I  18-20#	05 II  5-16#	97 I  8-20# 4-16#	15 I  14-20# 1-16#		
	19 I  19-20#	38 I  4-12#					
<b>16</b>	35 M  55-22D#	26 I  26-20#	06 I  6-12#	08 II  8-16#	99 I  21-20# 2-16#		
	35 M  66-22D#	32 I  32-20#	28 I  26-20# 2-16#	11 II  11-16#	30 I  29-20# 1-16#		
<b>18</b>	45 M  67-22D#	53 M  53-22D#	96 I  9-12#				
	35 M  79-22D#	41 I  41-20#	16 II  16-16#	39 I  37-20# 2-16#	11 II  11-12#		

Contact Legend    ○ 22D#    ● 20#    ◐ 16#    ◑ 12#

20	27  27-20#	25  25-20#	24  24-20#	02  65-22D#
	35  100-22D#	53  53-20#	21  21-16#	36  36-20#
22	55  55-20#	34  34-20#	32  32-20#	97  16-16#
	99  11-16#			
24	35  128-22D#	61  61-20#	04  48-20# 8-16#	29  29-16#
	24  12-16# 12-12#	43  23-20# 20-16#	19  19-12#	

Contact Legend  
 22D#   
 20#   
 16#   
 12#

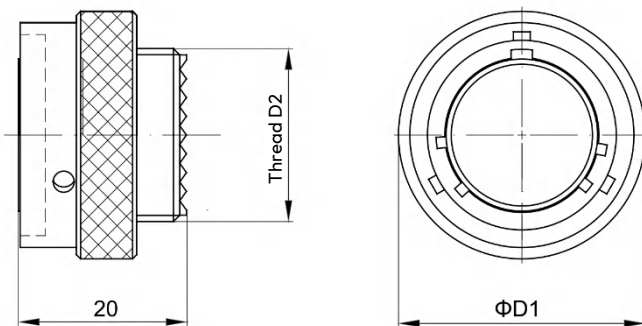
## 6. Keying Position



Keying Code	08	10	12	14	16	18	20	22	24
N	100°	100°	100°	100°	100°	100°	100°	100°	100°
A	82°	86°	80°	79°	82°	82°	82°	85°	85°
B		72°	68°	66°	70°	70°	70°	74°	74°
C	—	128°	132°	134°	130°	130°	130°	126°	126°
D	118°	114°	120°	121°	118°	118°	118	115°	115°

## 7. Sizes

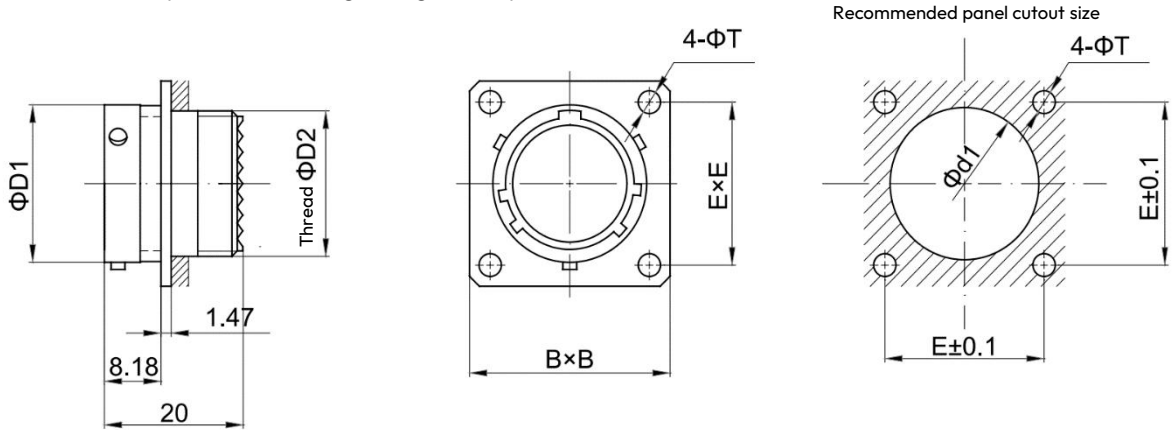
### 7.1 Plug MS27473/MS27484:



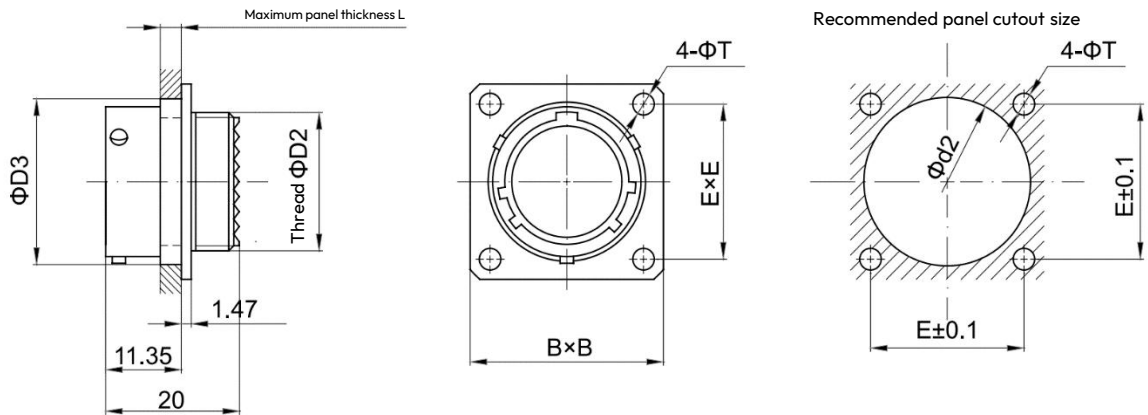
Shell Number	D1 (mm)	Thread D2 UNEF-2A
08	19.00	0.4375-28
10	21.80	0.5625-24
12	26.20	0.6875-24
14	29.30	0.8125-20
16	32.50	0.9375-20
18	35.70	1.0625-18
20	38.80	1.1875-18
22	41.68	1.3125-18
24	44.86	1.4375-18

## 7.2 Wall Mounting Flange Receptacle MS27472/MS27497:

MS27472 Crimp Wall Mounting Flange Receptacle



MS27497 Crimp Wall Mounting Flange Receptacle (Rear Mount)

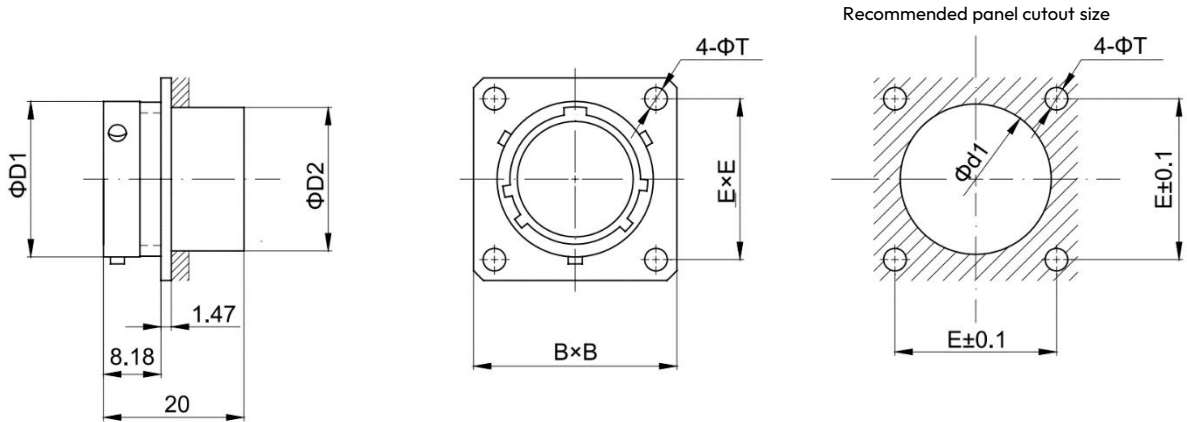


Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	L Max. (mm)	B (mm)	E (mm)	T (mm)	d1 (mm)	d2 (mm)
08	12.00	0.4375-28	13.20	3.71	21.00	15.09	3.2	12.5	14.2
10	15.00	0.5625-24	16.14	3.71	24.10	18.26	3.2	15.5	17.5
12	19.05	0.6875-24	20.50	3.71	26.50	20.62	3.2	19.5	21.3
14	22.23	0.8125-20	23.60	3.71	28.90	23.01	3.2	21.5	25.0
16	25.40	0.9375-20	26.80	3.71	31.21	24.6	3.2	25.0	27.3
18	28.58	1.0625-18	30.00	3.71	33.60	26.97	3.2	28.0	31.3
20	31.75	1.1875-18	33.20	4.27	36.80	29.36	3.2	31.5	34.5
22	34.93	1.3125-18	36.35	4.27	40.00	31.75	3.2	34.5	37.5
24	38.10	1.4375-18	39.50	4.27	43.10	34.93	3.9	37.5	40.6

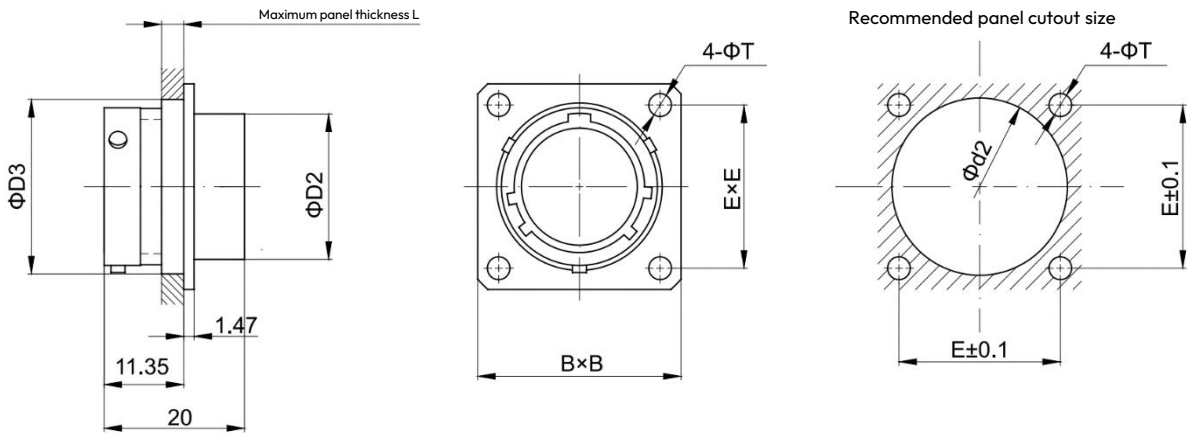


### 7.3 Box Mounting Flange Receptacle MS27513/MS27508:

MS27513 Crimp Box Mounting Flange Receptacle with grommet

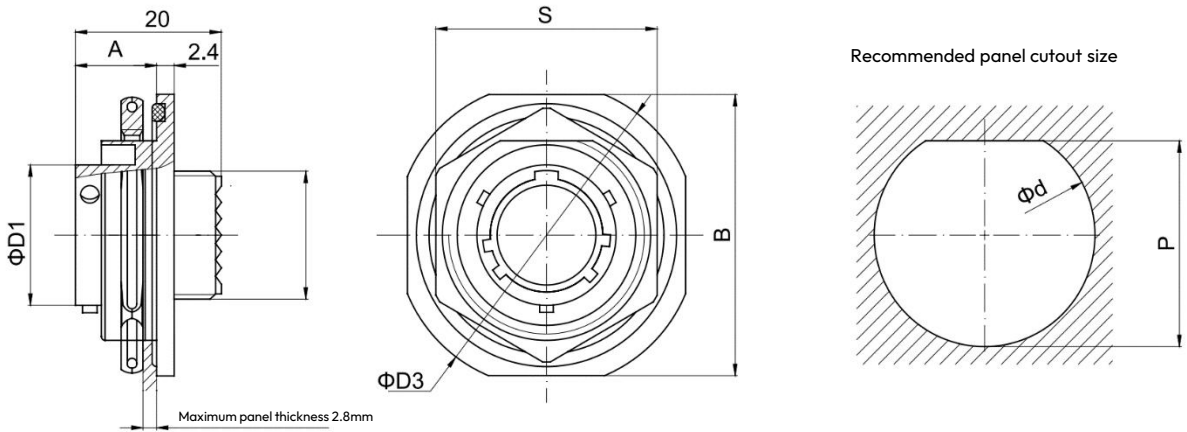


MS27508 Crimp Box Mounting Flange Receptacle (Rear Mount)



Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	L Max. (mm)	B (mm)	E (mm)	T (mm)	d1 (mm)	d2 (mm)
08	12.00	0.4375-28	13.20	3.71	21.00	15.09	3.2	12.5	14.2
10	15.00	0.5625-24	16.14	3.71	24.10	18.26	3.2	15.5	17.5
12	19.05	0.6875-24	20.50	3.71	26.50	20.62	3.2	19.5	21.3
14	22.23	0.8125-20	23.60	3.71	28.90	23.01	3.2	21.5	25.0
16	25.40	0.9375-20	26.80	3.71	31.21	24.6	3.2	25.0	27.3
18	28.58	1.0625-18	30.00	3.71	33.60	26.97	3.2	28.0	31.3
20	31.75	1.1875-18	33.20	4.27	36.80	29.36	3.2	31.5	34.5
22	34.93	1.3125-18	36.35	4.27	40.00	31.75	3.2	34.5	37.5
24	38.10	1.4375-18	39.50	4.27	43.10	34.93	3.9	37.5	40.6

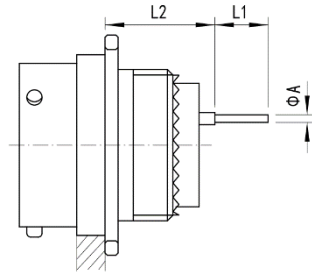
### 7.4 MS27474 Crimp Jam Nut Receptacle:



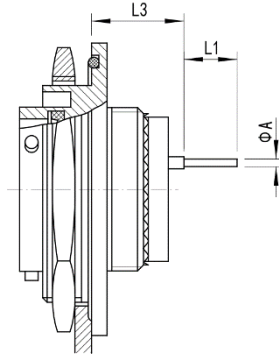
Shell Number	D1 (mm)	Thread D2 UNEF-2A	D3 (mm)	A (mm)	B (mm)	S (mm)	d (mm)	p (mm)
8	12	0.4375-28	34.95	11.13	31.75	27.41	22.46	21.08
10	15	0.5625-24	38.1	11.13	34.95	30.61	25.58	24.26
12	19.05	0.6875-24	41.28	11.13	38.1	33.4	28.8	27.53
14	22.23	0.8125-20	44.45	11.13	41.28	36.96	31.98	30.68
16	25.4	0.9375-20	49.23	11.13	45.24	40.1	35.15	33.86
18	28.58	1.0625-18	51.21	11.13	48	43.81	38.28	37.06
20	31.75	1.1875-18	54.38	11.13	51.21	46.45	41.5	40.03
22	34.93	1.3125-18	57.53	11.13	54.36	50.8	44.68	43.21
24	38.1	1.4375-18	60.71	11.13	57.53	54.41	47.85	46.38

## 7.5 MIL-DTL-38999 Series II Receptacles with PCB Contacts:

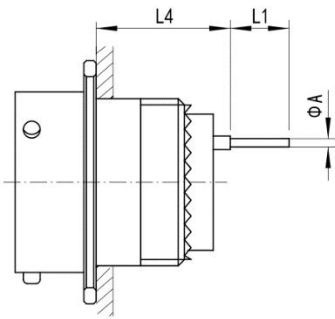
MS27497 Receptacle



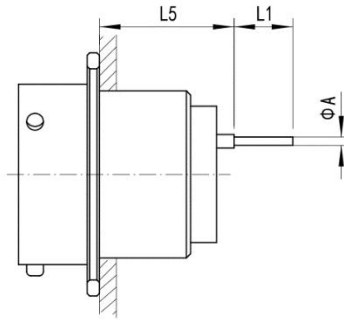
MS27474 Receptacle



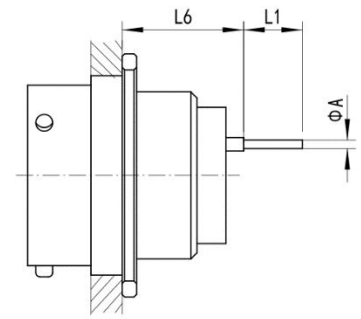
MS27472 Receptacle



MS27513 Receptacle



MS27508 Receptacle

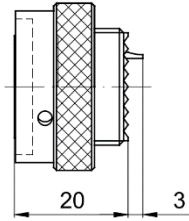


PCB Contact Types		L1 (mm)	A (mm)
22D#	Long PCB Contact	8.5	0.7
	Short PCB Contact	4.0	
20#	Long PCB Contact	8.5	0.7
	Short PCB Contact	5.1	
16#	Long PCB Contact	8.5	1.15
	Short PCB Contact	5.1	

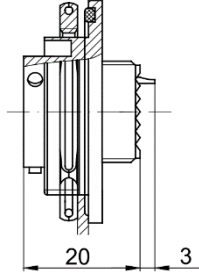
Dimensional Requirements for Various Contact Sizes		Shell Sizes	Shell Sizes
		08-10-12-14-16-18	20-22-24
L2	For 22D# pin/socket installation	13.4	13.4
	For 20# or 16# pin/socket installation	13.57	13.57
L3	For 22D# pin/socket installation	13.61	12.95
	For 20# or 16# pin/socket installation	13.78	13.12
L4	For 22D# pin/socket installation	15.1	15.1
	For 20# or 16# pin/socket installation	15.27	15.27
L5	For 22D# pin/socket installation	11.1	11.1
	For 20# or 16# pin/socket installation	11.27	11.27
L6	For 22D# pin/socket installation	9.4	9.4
	For 20# or 16# pin/socket installation	9.57	9.57

## 7.6 MIL-DTL-38999 Series II Solder-Type Product Dimensions:

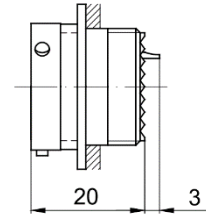
MS27473 Plug



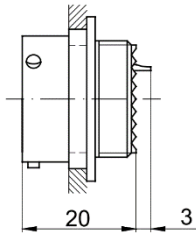
MS27474 Receptacle



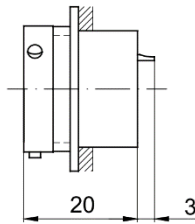
MS27472 Receptacle



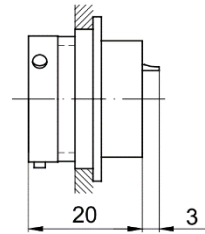
MS27497 Receptacle



MS27513 Receptacle



MS27508 Receptacle

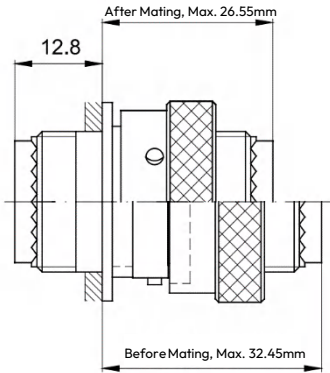


Solder Contact Sizes	Solder Cup Inner Diameter(mm)	Maximum Compatible Wire Gauge (AWG)
22D#	Φ0.9	22
20#	Φ1.1	20
16#	Φ1.7	16
12#	Φ2.49	12

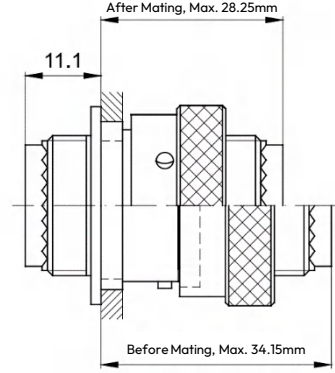
Note: Coaxial contacts do not utilize solder-type contacts.

## 7.7 Mated Dimensions of Plugs and Receptacles:

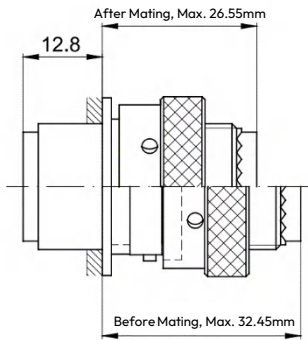
MS27472 Receptacle / MS27473 Plug



MS27497 Receptacle / MS27473 Plug



MS27513 Receptacle / MS27473 Plug



## 8. Protection Caps for Plugs and Receptacles

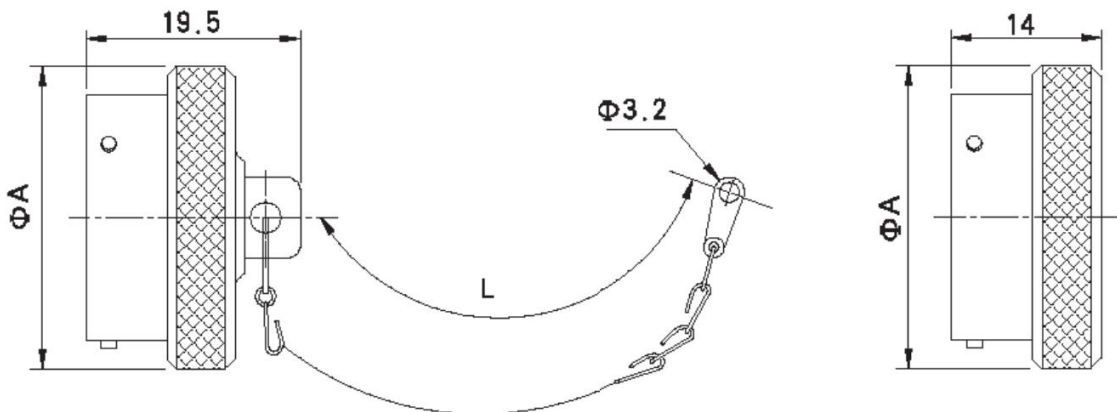
### 8.1 How to Order:

		MS27510	F	10	C	L
MS Number:	<b>MS27510</b> – Plug Protection Cap <b>MS27511</b> – Receptacle Protection Cap					
Finishes:	<b>B</b> – Olive drab cadmium <b>F</b> – Electroless nickel <b>E</b> – Passivated stainless steel					
Shell Sizes:	<b>08, 10, 12, 14, 16, 18, 20, 22, 24</b>					
Chain Type:	<b>A</b> – Without chain <b>N</b> – Stainless steel twisted chain with ring (for MS27468 receptacle) <b>C</b> – Stainless steel twisted chain <b>R</b> – Nylon rope <b>S</b> – Stainless steel wire rope					
Length marking:	<b>Unmarked</b> – Standard length (140mm for plug metal sealing cap, 100mm for receptacle metal sealing cap) <b>L</b> – Chain length 127mm <b>M</b> – Chain length 152.4mm (for MS27501 only) <b>N</b> – Chain length 177.8mm (for MS27501 only)					

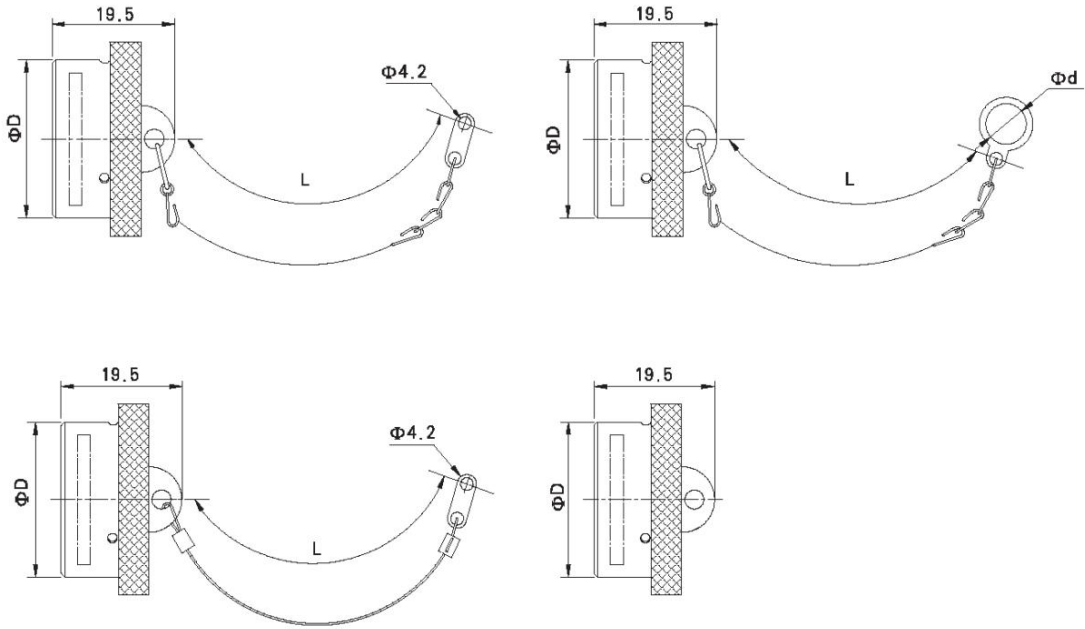
Note : Protection caps should be ordered separately and are not included with the connector.

### 8.2 Sizes:

#### Plug Protection Cap MS27510



**Receptacle Protection Cap MS27511**



Shell Sizes		08	10	12	14	16	18	20	22	24
A	MAX	18.2	21.5	25.4	28.7	31.7	35.0	38.1	41.4	44.4
D	MAX	185	21.7	25.3	29.0	31.6	34.8	38.0	41.1	44.2
d	MIN	22.6	26.0	29.0	32.4	35.5	38.6	42.0	44.7	48.5
L	MAX	76.2	76.2	88.9	88.9	88.9	88.9	101.6	101.6	101.6

## 9. Standard Accessories

Suitable for MIL-DTL-38999 Series I and II.

### 9.1 Part Number

	<b>M85049/</b>	<b>27</b>	<b>14</b>	<b>N</b>
Series:	<b>M85049/</b>			
Types:	<b>27</b> - A type Tail nut <b>49</b> - B type Straight cable clamp <b>47</b> - C type Angled cable clamp <b>62</b> - D type Shielded backshell (add "T" before series number) <b>62</b> - Heat shrink sleeve backshell <b>01</b> - Grounding compression type <b>06</b> - Spring-loaded cable protection type			
Shell Numbers:	Refer to the shell size table.			
Shell Plating:	<b>W</b> - Olive drab cadmium <b>N</b> - Electroless nickel <b>S</b> - Passivated stainless steel			

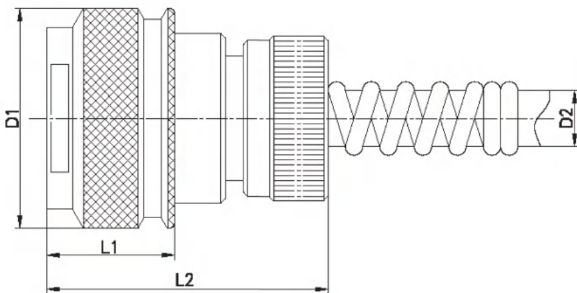
Note 01: Backshells should be ordered separately. If the quantity ordered is the same as that of the matching plug and receptacle, the abbreviation of the tailpiece accessory (A, B, C, or D) can be added directly after the model number of the matching header or receptacle. The abbreviation is for ordering and production management purposes only.

Note 02: shell size table.

Shell Numbers	08	10	12	14	16	18	20	22	24
Suitable for MIL-DTL-38999 Series I	09	11	13	15	17	19	21	23	25
Suitable for MIL-DTL-38999 Series II	08	10	12	14	16	18	20	22	24

### 9.2 Sizes

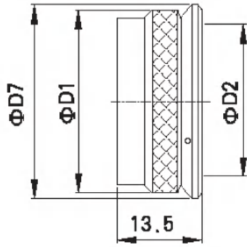
#### M85049/06 - Spring-loaded cable protection type backshell



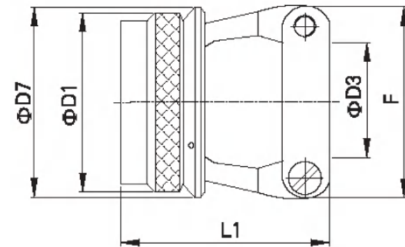
Part Number	D1(mm)	D2(mm)	L1(mm)	L2(mm)
M85049/06-08N	19.1	7.0	14.8	35
M85049/06-10N	21.6	10.0	14.8	35
M85049/06-12N	25.4	13.0	14.8	37
M85049/06-14N	27.5	15.0	14.8	37
M85049/06-16N	31.8	18.0	14.8	37
M85049/06-18N	35.6	20.0	14.8	40
M85049/06-20N	38.1	23.5	14.8	40
M85049/06-22N	41.9	26.5	14.8	45
M85049/06-24N	44.5	29	14.8	45



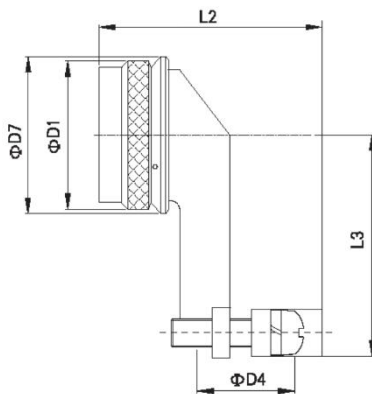
**M85049/27 - (HA Type) Tail Nut**



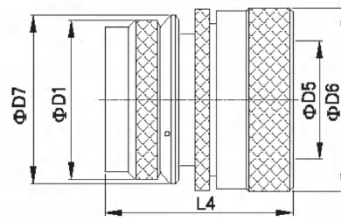
**M85049/49 - (HB Type) Straight Cable Clamp**



**M85049/47 - (HC Type) Angled Cable Clamp**

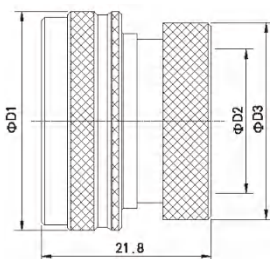


**M85049/62 - (HD Type) Shielded Backshell**



Shell Sizes		08	10	12	14	16	18	20	22	24
D1(mm)	MAX	156	18.6	218	25.0	28.2	31.0	34.2	37.3	40.5
D2(mm)	MAX	13.7	14.3	17.5	20.7	23.9	26.7	29.9	33.0	36.2
D3(mm)	MIN	3.2	4.8	6.5	7.4	8.1	8.8	9.3	9.8	10.3
	MAX	6.3	8.8	12.6	16.0	19.3	21.8	25.0	28.0	31.5
D4(mm)	MIN	3.2	4.8	6.5	7.4	8.1	8.8	9.3	9.8	10.3
	MAX	6.0	9.8	11.0	14.0	17.0	20.0	23.0	26.0	29.0
D5(mm)	MAX	7.0	10.0	13.0	16.05	19.05	21.6	24.3	26.3	28.9
D6(mm)	MAX	13.3	15.2	19.5	21.09	24.26	26.27	32.5	34.22	36.8
F(mm)	MAX	18.6	21.6	24.8	28.0	31.2	34.0	37.2	40.3	43.5
L1(mm)	MAX	22.3	24.3	24.3	24.3	24.3	24.3	24.3	26.3	28.8
L2(mm)	MAX	29.0	32.0	23.5	36.5	38.5	41.5	44.5	46.0	48.0
L3(mm)	MAX	25.0	26.0	27.5	31.0	32.5	34.0	34.5	36.5	43.5
L4(mm)	MAX	22.7	22.7	22.7	22.7	22.7	25.4	25.4	25.4	27.2

**M85049/62 - Heat shrink sleeve backshell**

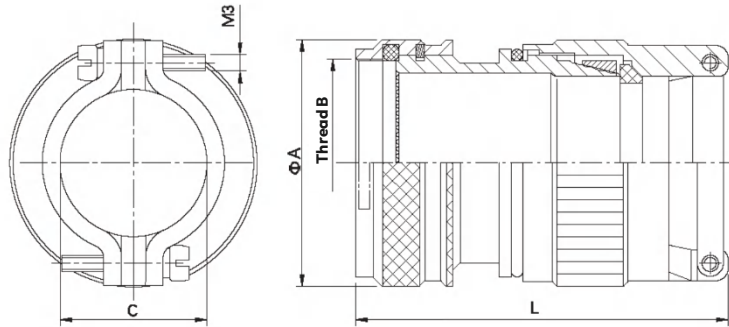


Part Number	D1	D2	D3
M85049/62-08N	15.6	6.7	115
M85049/62-10N	18.6	9.9	14.6
M85049/62-12N	21.7	12.8	17.6
M85049/62-14N	25.0	16.0	21.2
M85049/62-16N	28.2	19.2	24.4
M85049/62-18N	30.9	21.4	26.4
M85049/62-20N	34.2	24.6	30.9
M85049/62-22N	37.7	27.7	33.8
M85049/62-24N	40.4	30.5	36.8

# 10. Straight Shielded Cable Clamp (for Series I and II)

## 10.1 Part Number

	<b>M85049/</b>	<b>18A-</b>	<b>25</b>	<b>N</b>	<b>09</b>	<b>A</b>
Series:	<b>M85049/</b>					
Types:	<b>18A</b> - Straight Shielded Cable Clamp (for MIL-DTL-38999 Series I and II)					
Shell Numbers:	See table 01					
Shell Plating:	<b>W</b> - Olive drab cadmium <b>N</b> - Electroless nickel <b>S</b> - Passivated stainless steel					
Outlet diameter code:	See table 02					
Length code:	See table 03					



**Table 01:**

Shell Number	Outlet diameter code	A	Thread B
9	01 ~ 02	16.9	0.4375-28UNEF
11	01 ~ 03	20.9	0.5625-24UNEF
13	02 ~ 04	24.0	0.6875-24UNEF
15	02 ~ 05	27.0	0.8125-20UNEF
17	02 ~ 06	31.0	0.9375-20UNEF
19	03 ~ 07	33.0	1.0625-18UNEF
21	03 ~ 08	36.0	1.1875-18UNEF
23	03 ~ 09	39.0	1.3125-18UNEF
25	04 ~ 10	42.0	1.4375-18UNEF

**Table 02:**

Outlet diameter code	Outlet diameter C (mm)
01	1.57~3.18
02	3.18~6.35
03	6.35 ~ 9.53
04	9.53 ~ 12.7
05	12.7 ~ 15.88
06	15.88 ~ 19.05
07	19.05 ~ 22.23
08	22.23 ~ 25.4
09	25.4 ~ 28.58
10	28.58 ~ 31.75

**Table 03:**

Shell Number	Length Code	L (mm)
9 ~ 25	-	62.7
9 ~ 25	A	88.1
15 ~ 25	B	113.5
21 ~ 25	C	138.9