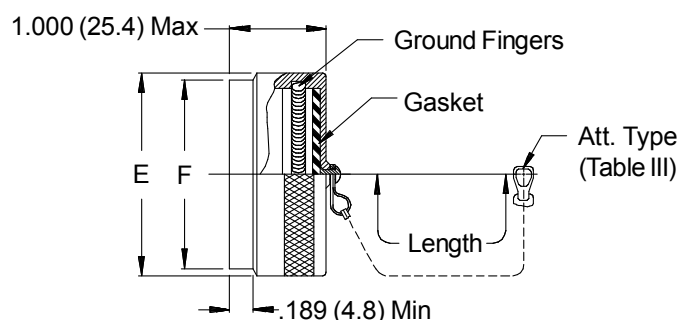
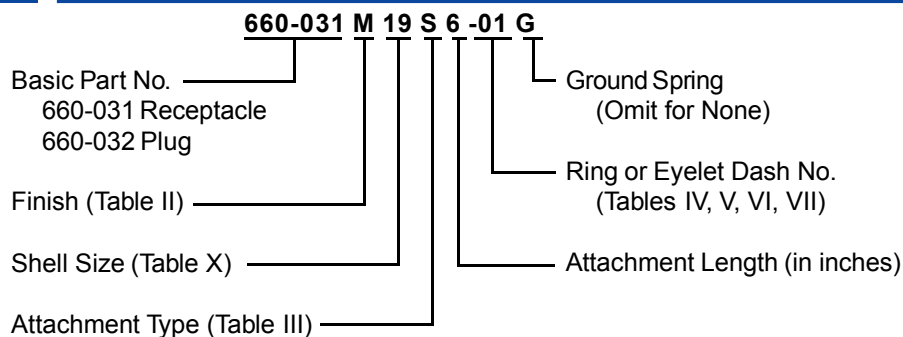


# 660-031 (Receptacle) - 660-032 (Plug) Protective Covers MIL-C-38999 Series IV

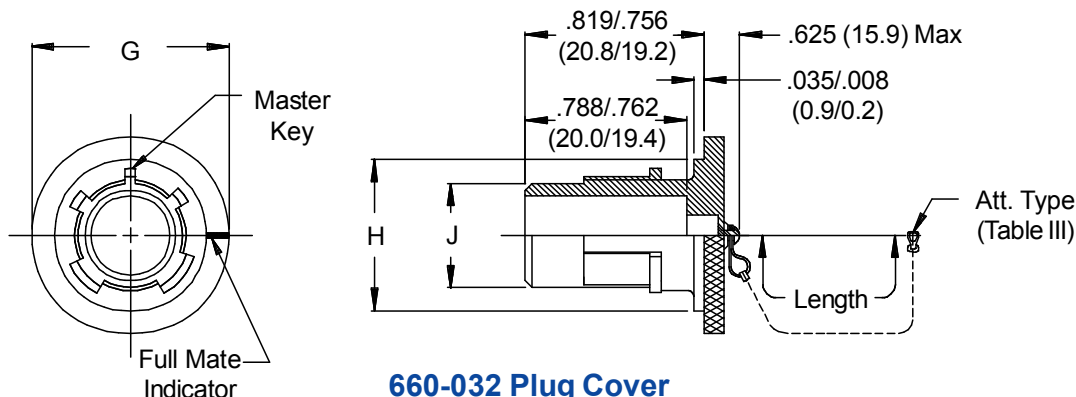
## MIL-C-38999 Series IV



**660-031 Receptacle Cover**

See inside back  
cover fold-out or  
page 14 for Table II.

Metric dimensions (mm)  
are indicated in paren-  
theses.



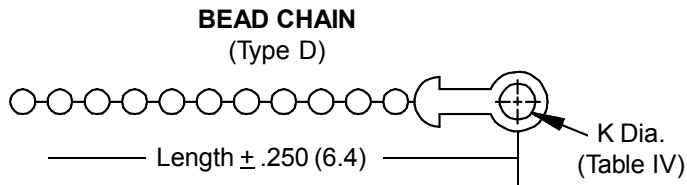
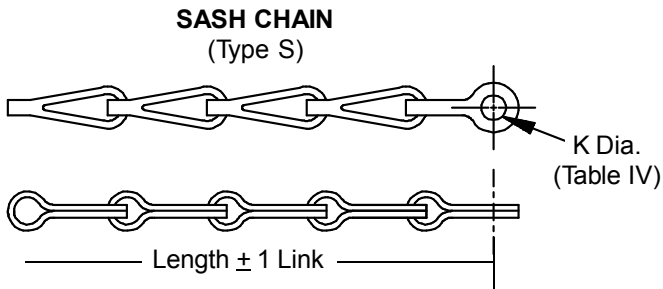
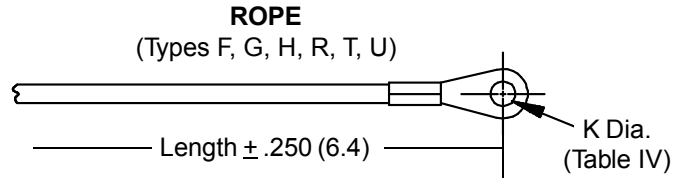
**660-032 Plug Cover**

**TABLE X: SHELL SIZE DIMENSIONS**

| Shell Size | Shell Size Code Ref. | E Dia Max    | F Dia Max    | G Dia Max    | H Dia +.0 (-0.015) | J Dia +.0 (-0.015) |
|------------|----------------------|--------------|--------------|--------------|--------------------|--------------------|
| 11         | B                    | .875 (22.2)  | .775 (19.7)  | 1.180 (30.0) | .793 (20.1)        | .509 (12.9)        |
| 13         | C                    | 1.000 (25.4) | .901 (22.9)  | 1.320 (33.5) | .919 (23.3)        | .634 (16.1)        |
| 15         | D                    | 1.125 (28.6) | 1.039 (26.4) | 1.440 (36.6) | 1.044 (26.5)       | .759 (19.3)        |
| 17         | E                    | 1.250 (31.8) | 1.150 (29.2) | 1.560 (39.6) | 1.170 (29.7)       | .885 (22.5)        |
| 19         | F                    | 1.375 (34.9) | 1.276 (32.4) | 1.680 (42.7) | 1.294 (32.9)       | 1.009 (25.6)       |
| 21         | G                    | 1.500 (38.1) | 1.402 (35.6) | 1.820 (46.2) | 1.419 (36.0)       | 1.134 (28.8)       |
| 23         | H                    | 1.625 (41.3) | 1.528 (38.8) | 1.940 (49.3) | 1.544 (39.2)       | 1.259 (32.0)       |
| 25         | J                    | 1.750 (44.5) | 1.650 (41.9) | 2.060 (52.3) | 1.669 (42.4)       | 1.384 (35.2)       |



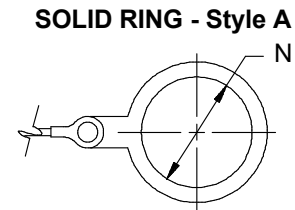
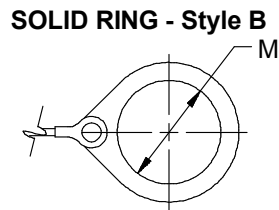
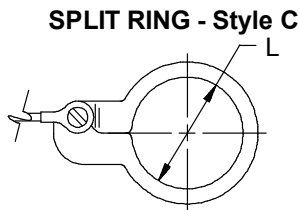
# 660-031 (Receptacle) - 660-032 (Plug) Protective Covers MIL-C-38999 Series IV

**TABLE III: ATTACHMENT**

| Sym | Attachment Type                              |
|-----|----------------------------------------------|
| D   | Bead Chain, Cres., Passivate                 |
| F   | Wire Rope, Nylon Jacket                      |
| G   | Nylon Rope                                   |
| H   | Wire Rope, Teflon Jacket                     |
| N   | No Attachment                                |
| R   | Wire Rope, PVC Jacket                        |
| S   | #8 Sash Chain, Cres., Passivate              |
| T   | Wire Rope, No Jacket                         |
| U   | Wire Rope, Polyurethane Jacket with Terminal |

**TABLE IV: EYELET**

| Dash No. | K DIA. ±.010 (0.3) |
|----------|--------------------|
| 01       | .140 (3.6)         |
| 02       | .182 (4.6)         |
| 03       | .191 (4.9)         |
| 04       | .197 (5.0)         |
| 05       | .167 (4.2)         |
| 06       | .125 (3.2)         |
| 07       | .218 (5.5)         |
| 09       | .156 (4.0)         |
| 00       | No Eyelet          |

**TABLE V: SPLIT RING STYLE C**

| Dash No. | L Dia. ±.015 (0.4) | Dash No. | L Dia. ±.015 (0.4) |
|----------|--------------------|----------|--------------------|
| 50       | .425 (10.8)        | 74       | 1.625 (41.3)       |
| 52       | .485 (12.3)        | 76       | 1.750 (44.5)       |
| 54       | .640 (16.3)        | 78       | 1.875 (47.6)       |
| 56       | .750 (19.1)        | 80       | 1.980 (50.3)       |
| 58       | .890 (22.6)        | 82       | 2.060 (52.3)       |
| 60       | 1.015 (25.8)       | 84       | 2.235 (56.8)       |
| 62       | 1.095 (27.8)       | 86       | 2.310 (58.7)       |
| 64       | 1.130 (28.7)       | 88       | 2.475 (62.9)       |
| 66       | 1.250 (31.8)       | 90       | 2.655 (67.4)       |
| 68       | 1.350 (34.3)       | 92       | 2.810 (71.4)       |
| 70       | 1.390 (35.3)       | 94       | 3.045 (77.3)       |
| 72       | 1.485 (37.7)       |          |                    |

**TABLE VI: SOLID RING STYLE B**

| Dash No. | M Dia. ±.015 (0.4) | Dash No. | M Dia. ±.015 (0.4) |
|----------|--------------------|----------|--------------------|
| 08       | .468 (11.9)        | 24       | 1.484 (37.7)       |
| 10       | .593 (15.1)        | 25       | 1.577 (40.1)       |
| 12       | .718 (18.2)        | 27       | 1.640 (41.7)       |
| 13       | .765 (19.4)        | 28       | 1.687 (42.8)       |
| 14       | .844 (21.4)        | 29       | 1.765 (44.8)       |
| 15       | .890 (22.6)        | 30       | 1.890 (48.0)       |
| 16       | .968 (24.6)        | 31       | 1.953 (49.6)       |
| 17       | 1.015 (25.8)       | 32       | 1.968 (50.0)       |
| 18       | 1.093 (27.8)       | 33       | 2.077 (52.8)       |
| 19       | 1.140 (29.0)       | 35       | 2.140 (54.4)       |
| 20       | 1.203 (30.6)       | 36       | 2.187 (55.5)       |
| 21       | 1.265 (32.1)       | 40       | 2.406 (61.1)       |
| 22       | 1.343 (34.1)       | 44       | 2.656 (67.5)       |
| 23       | 1.453 (36.9)       | 48       | 3.031 (77.0)       |
|          |                    | 118      | .310 (7.9)         |

**TABLE VII: SOLID RING STYLE A**

| Dash No. | N Dia. ±.015 (0.4) | Dash No. | N Dia. ±.015 (0.4) |
|----------|--------------------|----------|--------------------|
| 095      | .312 (7.9)         | 109      | 1.266 (32.2)       |
| 100      | .391 (9.9)         | 209      | 1.312 (33.3)       |
| 101      | .516 (13.1)        | 110      | 1.391 (35.3)       |
| 102      | .583 (14.8)        | 210      | 1.438 (36.5)       |
| 103      | .641 (16.3)        | 111      | 1.521 (38.6)       |
| 104      | .708 (18.0)        | 211      | 1.536 (39.0)       |
| 105      | .766 (19.5)        | 112      | 1.641 (41.7)       |
| 205      | .788 (20.0)        | 113      | 1.766 (44.9)       |
| 106      | .896 (22.2)        | 213      | 1.812 (46.0)       |
| 206      | .907 (23.0)        | 114      | 1.891 (48.0)       |
| 107      | 1.016 (25.8)       | 214      | 1.938 (49.2)       |
| 207      | 1.025 (26.0)       | 115      | 2.078 (52.8)       |
| 108      | 1.141 (29.0)       | 116      | 2.406 (61.1)       |
| 308      | 1.188 (30.2)       | 117      | 2.510 (63.8)       |
| 208      | 1.203 (30.6)       |          |                    |



## Reference Information Standard Materials and Finishes

**TABLE II - STANDARD FINISHES**

| GLENAIR SYMBOL | M85049 SYMBOL<br>REFERENCE ONLY | FINISH                                                   | SPECIFICATION(S)                                                                      |
|----------------|---------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|
| A              |                                 | Cadmium Plate, Bright                                    | AMS-QQ-P-416, Type I, Class 2                                                         |
| B              |                                 | Cadmium Plate, Olive Drab                                | AMS-QQ-P-416, Type II, Class 3                                                        |
| C*             | A                               | Anodize, Black                                           | AMS-A-8625, Type II, Class 2                                                          |
| G*             |                                 | Hard Coat, Anodic                                        | AMS-A-8625, Type III, Class 1                                                         |
| J              |                                 | Iridite, Gold Over Cadmium Plate Over Electroless Nickel | MIL-C-5541, Class 3 AMS-QQ-P-416, Type II, Class 3 over AMS-C-26074, Class 4, Grade B |
| LF             |                                 | Cadmium Plate, Bright Over Electroless Nickel            | 1000 Hour Corrosion Resistance                                                        |
| M              | N                               | Electroless Nickel                                       | AMS-C-26074, Class 4, Grade B                                                         |
| N              |                                 | Cadmium Plate, Olive Drab Over Electroless Nickel        | AMS-QQ-P-416, Type II, Class 3 over Electroless Nickel AMS-C-26074                    |
| NC             |                                 | Zinc Cobalt, Dark Olive Drab                             | 96 Hour Corrosion Resistance                                                          |
| NF             | W                               | Cadmium Plate, Olive Drab Over Electroless Nickel        | 1000 Hour Corrosion Resistance                                                        |
| T              |                                 | Cadmium Plate, Bright Over Electroless Nickel            | AMS-QQ-P-416, Type I, Class 3<br>ASTMB 733-90, SC2, Type I, Class 5, MIL-C-26074***   |
| U              |                                 | Cadmium Plate, Black                                     | AMS-QQ-P-416, Type II, Class 3                                                        |
| ZU**           |                                 | Cadmium Plate, Black                                     | AMS-QQ-P-416, Type II, Class 3                                                        |
| ZN             |                                 | Zinc-Nickel Alloy, Olive Drab                            | ASTMB 841-91, Over Electroless Nickel 1000 Hour Salt Spray                            |

\* Anodize finish; not suitable for EMI Shielding or grounding applications.  
 \*\* Applicable to corrosion resisting steel backshells and accessories. Consult factory for other available finishes.

The following standard materials are used for the majority of Glenair backshells and connector accessories. However, backshell components are not limited to those items listed, but are representative of

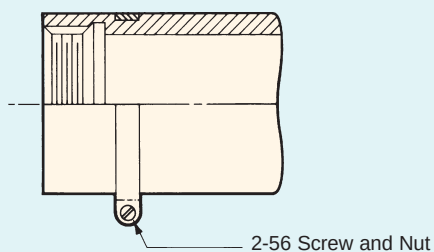
the elements used in Glenair's general accessory products. Contact Glenair for applicable specifications on items not listed below.

**STANDARD MATERIALS - BACKSHELLS AND ACCESSORIES**

| COMPONENT                                                                                                                                                                                                        | MATERIAL                     | SPECIFICATION                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------|
| Machined components: such as backshell bodies, fabricated elbows, protective covers, rotatable couplers, dummy stowage receptacles, lock nuts, G-spring support rings, EMI ground rings, grommet followers, etc. | Aluminum                     | AMS-QQ-A-200<br>ASTMB221, 209         |
| Die cast components: such as angular backshells, strain relief backshells, strain relief bodies, strain relief saddles, special EMI ground rings, etc.                                                           | Aluminum                     | QQ-A-591<br>ASTMB85, 26               |
| Backshells or strain reliefs: available in optional corrosion resisting steel; and hardware: such as screws, washers, rivets, wire rope, sash chain, band straps, etc.                                           | Corrosion Resisting Steel    | ASTMA582 (300 Series)<br>AMS-QQ-S-763 |
| Elastomeric seals: such as O-rings, cable jacket seals, grommets, etc.                                                                                                                                           | Silicone                     | ZZ-R-765, MIL-R-25988                 |
| Anti-friction and thrust washers                                                                                                                                                                                 | Teflon                       | TFE                                   |
| Anti-rotation device                                                                                                                                                                                             | Corrosion Resistant Material | N/A                                   |

**BODY STRAP**

Glenair offers an optional stainless steel body strap for attaching protective covers as illustrated. To specify body strap, add suffix letter C to the end of the part number. For example 360AS001M1610M6C.


**NOTES**

On all length callouts, tolerance is  $\pm .060$  unless otherwise specified.

Unless otherwise specified, the following other dimensional tolerances will apply:

.xx =  $\pm .03$  (0.8)  
 .xxx =  $\pm .015$  (0.4)  
 Lengths =  $\pm .060$  (1.52)  
 Angles =  $\pm 5^\circ$

Metric dimensions (mm) are indicated in parentheses

**NOTE: For your convenience these tables have been reproduced inside the back cover fold-out.**

# Glenair Backshell and Accessory Material and Finish Options

Backshell and accessory base materials, plating options, specifications and codes

| Code                | Material        | Finish                     | Finish Specification                                      | Hrs. Salt Spray | Electrical Conductivity | Operating Temp. Range |  | Notes                                                        |
|---------------------|-----------------|----------------------------|-----------------------------------------------------------|-----------------|-------------------------|-----------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <a href="#">A</a>   | Aluminum        | Cadmium, No Chromate       | SAE-AMS-QQ-P-416 Type I Class 3                           | 48              | Conductive              | -65 to +175°C         |                                                                                     | Not recommended for new projects. LF is preferred.           |
| <a href="#">AB</a>  | Marine Bronze   | Unplated                   |                                                           | 1000            | Conductive              | -65 to +200°C         | ✓                                                                                   | Marine and geophysical applications.                         |
| <a href="#">AL</a>  | Aluminum        | AlumiPlate, Clear Chromate | MIL-DTL-83488, Class 2, Type II over electroless nickel   | 1000            | Conductive              | -65 to +175°C         | ✓                                                                                   | Approved for MIL-DTL-38999L and MIL-DTL-83513G.              |
| <a href="#">B</a>   | Aluminum        | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 3                          | 96              | Conductive              | -65 to +175°C         |                                                                                     | Not recommended for new projects. NF is preferred.           |
| <a href="#">C</a>   | Aluminum        | Anodize, Black             | AMS-A-8625 Type II Class 2                                | 336             | Non-Conductive          | -65 to +175°C         | ✓                                                                                   | Glenair's standard black anodize finish.                     |
| <a href="#">E</a>   | Aluminum        | Chem Film                  | MIL-DTL-5541 Type 1 Class 3                               | 168             | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard chem film finish.                         |
| <a href="#">G</a>   | Aluminum        | Anodize, Hardcoat          | AMS-A-8625 Type III, Class 1, .001" thick                 | 336             | Non-Conductive          | -65 to +200°C         | ✓                                                                                   | Glenair's preferred hardcoat finish.                         |
| <a href="#">J</a>   | Aluminum        | Cadmium, Gold              | SAE-AMS-QQ-P-416 Type II, Class 2 over electroless nickel | 500             | Conductive              | -65 to +175°C         |                                                                                     | Not recommended for new projects. JF is preferred.           |
| <a href="#">JF</a>  | Aluminum        | Cadmium, Gold              | SAE-AMS-QQ-P-416 Type II, Class 2 over electroless nickel | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's preferred gold cadmium finish.                     |
| <a href="#">LF</a>  | Aluminum        | Cadmium, Clear             | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's preferred clear cadmium finish.                    |
| <a href="#">M</a>   | Aluminum        | Electroless Nickel         | AMS-C-26074 Class 4 Grade B; ASTM-B-733, SC 2, Type IV    | 48              | Conductive              | -65 to +200°C         | ✓                                                                                   | Glenair's standard electroless nickel finish.                |
| <a href="#">MT</a>  | Aluminum        | Nickel-PTFE                | GMF-002 Type II Class 1                                   | 1000            | Conductive              | -65 to +175°C         | ✓                                                                                   | Approved for MIL-DTL-38999L and MIL-DTL-83513G.              |
| <a href="#">N</a>   | Aluminum        | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 3 over electroless nickel  | 500             | Conductive              | -65 to +175°C         |                                                                                     | Not recommended for new projects. NF is preferred.           |
| <a href="#">NC</a>  | Aluminum        | Zinc-Cobalt, Olive Drab    | ASTM B 840 Grade 6 Type D over electroless nickel         | 350             | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard olive drab zinc-cobalt finish.            |
| <a href="#">NF</a>  | Aluminum        | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard olive drab cadmium finish.                |
| <a href="#">P</a>   | Stainless Steel | Electrodeposited Nickel    | SAE-AMS-QQ-N-290 Class 1 Grade F                          | 500             | Conductive              | -65 to +200°C         | ✓                                                                                   | Use ZM for electroless nickel alternative.                   |
| <a href="#">T</a>   | Aluminum        | Cadmium, No Chromate       | SAE-AMS-QQ-P-416 Type I Class 3                           | 48              | Conductive              | -65 to +175°C         |                                                                                     | Not recommended for new projects. LF is preferred.           |
| <a href="#">TP2</a> | Titanium        | Electrodeposited Nickel    | SAE-AMS-QQ-N-290 Class 1 Grade F                          | 96              | Conductive              | -65 to +200°C         | ✓                                                                                   | Glenair's preferred finish for titanium connectors.          |
| <a href="#">U</a>   | Aluminum        | Cadmium, Black             | SAE-AMS-QQ-P-416 Type I Class 3                           | 48              | Conductive              | -65 to +175°C         |                                                                                     | Not recommended for new projects. UF is preferred.           |
| <a href="#">UC</a>  | Aluminum        | Zinc-Cobalt, Black         | ASTM B 840 Grade 6 Type D over electroless nickel         | 350             | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard black zinc-cobalt finish.                 |
| <a href="#">UCR</a> | Aluminum        | Zinc-Cobalt, Black         | ASTM B 840 Grade 6 Type D over electroless nickel         | 350             | Conductive              | -65 to +175°C         | ✓                                                                                   | RoHS version of UC.                                          |
| <a href="#">UF</a>  | Aluminum        | Cadmium, Black             | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's preferred black cadmium finish.                    |
| <a href="#">XAL</a> | Composite       | AlumiPlate                 | MIL-DTL-86448, Class 2, Type II over electroless nickel   | 2000            | Conductive              | -65 to +175°C         | ✓                                                                                   | Approved for MIL-DTL-38999L.                                 |
| <a href="#">XB</a>  | Composite       | Unplated Black             |                                                           | 2000            | Non-Conductive          | -65 to +175°C         | ✓                                                                                   | Glenair's standard unplated composite.                       |
| <a href="#">XM</a>  | Composite       | Electroless Nickel         | AMS-C-26074                                               | 2000            | Conductive              | -65 to +175°C         | ✓                                                                                   | Glenair's standard electroless nickel finish over composite. |
| <a href="#">XMT</a> | Composite       | Nickel-PTFE                | GMS-002 Class 2 Type II                                   | 2000            | Conductive              | -65 to +175°C         | ✓                                                                                   | Approved for MIL-DTL-38999L.                                 |
| <a href="#">XO</a>  | Composite       | Unplated Light Brown       |                                                           | 2000            | Non-Conductive          | -65 to +175°C         | ✓                                                                                   | Not recommended for new projects. Use XB.                    |
| <a href="#">XW</a>  | Composite       | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 3 over electroless nickel  | 2000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard olive drab cadmium finish over composite. |
| <a href="#">XZN</a> | Composite       | Zinc-Nickel, Black         | ASTM B841 Grade 5 over electroless nickel                 | 2000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard black zinc-nickel finish over composite.  |
| <a href="#">Z1</a>  | Stainless Steel | Passivate                  | SAE-AMS-SAE-AMS-QQ-P-35 Type VI                           | 1000            | Conductive              | -65 to +200°C         | ✓                                                                                   | Glenair's standard passivated stainless steel.               |
| <a href="#">Z2</a>  | Aluminum        | Gold                       | MIL-DTL-45204 Class 1 over electroless nickel             | 48              | Conductive              | -65 to +200°C         | ✓                                                                                   | Glenair's standard gold plating for space programs.          |
| <a href="#">ZC</a>  | Stainless Steel | Zinc-Cobalt, Black         | ASTM-B840, Grade 6                                        |                 | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard zinc-cobalt over stainless steel.         |
| <a href="#">ZCR</a> | Stainless Steel | Zinc-Cobalt, Black         | ASTM-B840, Grade 6                                        |                 | Conductive              | -65 to +175°C         | ✓                                                                                   | RoHS version of ZC.                                          |
| <a href="#">ZL</a>  | Stainless Steel | Electrodeposited Nickel    | SAE-AMS-QQ-N-290 Class 1 Grade F                          | 1000            | Conductive              | -65 to +200°C         | ✓                                                                                   | Used on hermetic connectors. Use ZM for other applications.  |
| <a href="#">ZM</a>  | Stainless Steel | Electroless Nickel         | AMS-C-26074 Class 1 Grade A                               |                 | Conductive              | -65 to +200°C         | ✓                                                                                   | Glenair's preferred nickel-plated stainless steel.           |
| <a href="#">ZMT</a> | Stainless Steel | Nickel-PTFE                | GMF-002 Type II Class 3                                   | 1000            | Conductive              | -65 to +175°C         | ✓                                                                                   | Glenair's new 1000 Hour Grey over stainless steel.           |
| <a href="#">ZN</a>  | Aluminum        | Zinc-Nickel, Olive Drab    | ASTM B841 Grade 5 over electroless nickel                 | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard olive drab zinc-nickel finish.            |
| <a href="#">ZNU</a> | Aluminum        | Zinc-Nickel, Black         | ASTM B841 Grade 5 over electroless nickel                 | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard black zinc-nickel finish.                 |
| <a href="#">ZR</a>  | Aluminum        | Zinc-Nickel, Black         | ASTM B841 Grade 5 over electroless nickel                 | 500             | Conductive              | -65 to +175°C         | ✓                                                                                   | Glenair's RoHs compliant black zinc-nickel.                  |
| <a href="#">ZU</a>  | Stainless Steel | Cadmium, Black             | SAE-AMS-QQ-P-416 Type II Class 3                          | 1000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard black cadmium over stainless steel.       |
| <a href="#">ZW</a>  | Stainless Steel | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  | 2000            | Conductive              | -65 to +175°C         |                                                                                     | Glenair's standard olive drab cadmium over stainless steel.  |

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