

DETAIL SPECIFICATION SHEET

CONNECTORS, ELECTRICAL, BACKSHELL, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

The requirements for acquiring the product described herein
shall consist of this specification sheet and SAE AS85049.

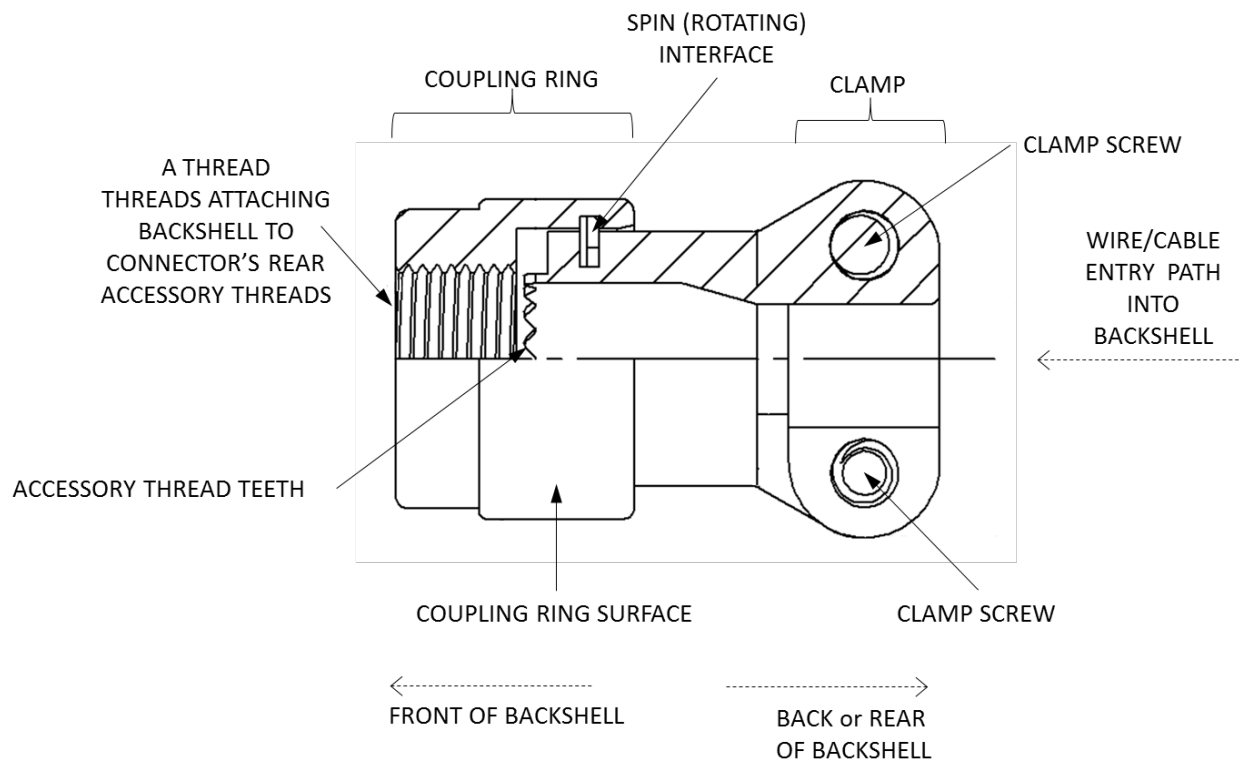


FIGURE 1. Backshell example (strain relief clamp, straight spin coupling used for illustration).



REQUIREMENTS

TABLE I. Backshell details.

Informational			Shell size	A Thread Connector Side Coupling Threads (Inch) UNEF-2B	Backshell Size. Coupling Thread Major Dia. (in 16ths of an inch)	Coupling Ring O.D. (see spec. sheet figures)	
Shell size	A Thread	Typ. Comm. Bk. Size				B, max	C, max
08	.3750-32	11	08	.3750-32	06	0.570	0.465
09	.4375-28	07	09	.4375-28	07	0.637	0.530
10	.5000-28	08	10	.5000-28	08	0.700	0.595
11	.5625-24	09	11	.5625-24	09	0.758	0.650
12	.6250-24	10	12	.6250-24	10	0.819	0.715
15	.7500-20	13	15	.7500-20	12	0.930	0.830
18	.9375-20	14	18	.9375-20	15	1.137	1.020
23	1.1875-18	17	23	1.1875-18	19	1.387	1.280

Notes:

1. Light gray shade is for informational data only. Provided for ease of cross referencing. Shall not be a requirement. Shall not override or take precedent over any other requirements. Typical commercial backshell size (Typ Comm. Bk. Size) are the commonly used sizes used at the inception of this specification. The accuracy and consistency of these numbers are not guaranteed and should always be verified.

Backshell interface with the connector shall be in accordance with [figure 1](#).

Class and associated parameters (including but not limited to the material, finish, temperature range, and salt spray) shall be in accordance with MIL-DTL-32689.

Coupling ring surface: The coupling ring shall be of one following constructions:

- coupling ring with one or more of the following surfaces:
 - straight axial ribbed
 - straight axial flute
 - diamond knurled
- hexagonal coupling ring

The coupling ring is defined as the gripping surface used to engage the backshell threads onto the connector threads. The coupling ring as defined varies from a distinct ring separate from the main shell on more complicated backshells (environmental) to being an integrated part of the main shell on simpler backshell constructions (shorting cap).

For outer diameter dimensions, the measurement shall be taken from the highest feature (i.e. highest point of knurling or widest measurement on hexagonal coupling ring).

Strain relief style: The strain relief style specifies the configuration of the backshell opposite the connector. The strain relief shall be identified as specified in [table II](#).

TABLE II. Strain relief style.

Strain relief style identifier	Description
B	Banding platform (no band supplied)
C	Clamp
K	Banding platform (micro band supplied)
N	Compression Nut

Clamp screws and washers shall be stainless steel passivated in accordance with AMS-QQ-P-35, ASTM A967/A967M, or AMS 2700.

Grommets and o-rings: Silicone rubber or silicone elastomer

Length code: For backshells with user specified lengths, the length parameter as specified in the specification sheet shall be coded as specified in [table III](#).

TABLE III. Backshell length code.

Length code (in 8ths of an inch)	Length (inch) $\pm .032$	Length code (in 8ths of an inch)	Length (inch) $\pm .032$
05	0.625	13	1.625
06	0.750	14	1.750
07	0.875	15	1.875
08	1.000	16	2.000
09	1.125	17	2.125
10	1.250	18	2.250
11	1.375	19	2.375
12	1.500	20	2.500

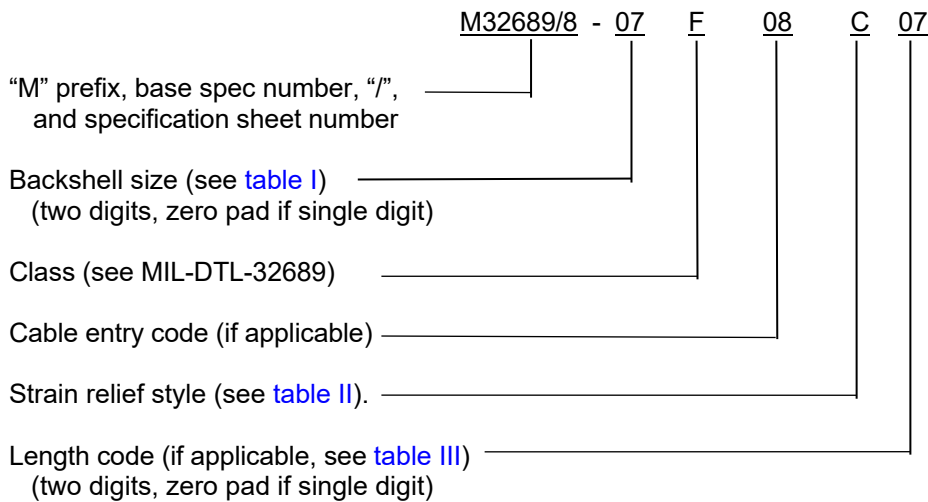
Lengths outside of the range of the table above are allowed using the eighth of an inch convention. Some lengths have minimums or maximums otherwise defined (i.e. a backshell length may be restricted to a minimum of .625 due to the spacing and dimensions of other elements in the design).

Dummy connector test fixture and/or a dummy cable test plug in accordance with SAE AS 85049 may be used.

Marking shall be in accordance with MIL-DTL-32689.

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Part or Identifying Number (PIN) example unless otherwise specified:



Qualification. Qualification shall be performed in accordance with SAE AS85049. The follow details shall apply

- Requirements and testing from MIL-DTL-32689 shall not apply unless otherwise called out outside of the MIL-DTL-32689 document (i.e SAE AS85049, this specification sheet, or a referencing document)
- Testing shall include:
 - SAE AS85049 testing
 - Any verification or testing needed to validate the requirements of this specification sheet or a referencing document

Designs

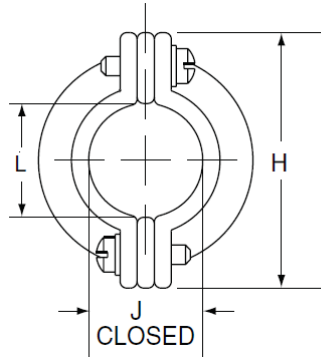
Backshells are sub-divided into different designs. Each design contains the common requirements, verifications, and dimensions across two or more backshells.

Numeric sub-divisions. Designs (i.e. Design 1) may be sub-divided into further sub-design (i.e. Design 1.1). The sub-division of the design is identified with a numeral. All requirements, verifications, and dimensions of the design (i.e. Design 1) shall apply to sub-designs (Design 1.1). This is applies for further additional levels of sub-divisions of the sub-design (i.e. Design 1.1.1). Sub-divisions of designs are typical done across styles or families backshells.

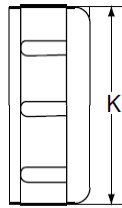
Alphabetic sub-divisions. An independent subdivision of design (i.e. Design 1) of is allowed with an alphabetic character (i.e Design 1.A). Alphabetic sub-divisions (i.e Design 1.A) have multiple sets of requirements, verifications, and dimensions. An additional level subdivision (using a numeral, i.e. Design 1.A.1) is used to unique identify which set of requirements, verifications, and dimensions. For example Design 1.A.1 is used in Environmental (Design 1.1) and EMI (Design 1.2) 90° spin (rotatable) coupling backshell and Design 1.A.2 is used in Environmental EMI (Design 1.3) 90° spin (rotatable) coupling backshell. Alphabetic sub-divisions are secondary to numeric sub-divisions. All requirements, verifications, and dimensions of the design (i.e. Design 1) shall not apply to alphabetic sub-designs (Design 1.A) unless otherwise stated.

Design 1 – Environmental, EMI, and Environmental EMI

Valid strain relief styles are C, N. All other styles are invalid for this design.



Saddle clamp



Compression nut

FIGURE 2. Design 1 details.

TABLE IV. Design 1: Dimensions based on backshell size.

Informational			Backshell Size.	Standard Length	
Shell size	A Thread	Typ. Comm. Bk. Size		Fixed (direct) coupling	Spin (rotatable) coupling
08	.3750-32	11	06	0.625	0.750
09	.4375-28	07	07	0.750	
10	.5000-28	08	08		
11	.5625-24	09	09		
12	.6250-24	10	10		
15	.7500-20	13	12	0.875	0.875
18	.9375-20	14	15	1.000	1.000
23	1.1875-18	17	19	1.125	1.125

Notes:

1. Length (including standard length) only applies to straight connectors (not angled connectors (i.e. 45°)). Minimum length is the standard length. Standard length is given for information only. Length shall be specified in the part number for straight backshells (even with the standard length) and omitted for other backshells.
2. Light gray shade is for informational data only. Provided for ease of cross referencing. Shall not be a requirement. Shall not override or take precedent over any other requirements. Typical commercial backshell size (Typ Comm. Bk. Size) are the commonly used sizes used at the inception of this specification. The accuracy and consistency of these numbers are not guaranteed and should always be verified.

TABLE V. Design 1: Dimensions based on cable entry code.

Cable Entry Code (16 th of nominal max wire/cable O.D.)	Informational	D max.	E max.	F max.	H dia. ± .015	J dia. ± .030	K dia. ± .015	L Nom. Min., Ref.	Minimum backshell size
	Typ. Comm C. E. Code								
01	Unused								
02	01	0.603	0.581	0.724	0.496	0.110	0.398	.125	06
03	02				0.582	0.170	0.460	.188	
04	03				0.656	0.230	0.523	.250	
05	04	0.629	0.607	0.786	0.726	0.300	0.585	.313	07
06	05				0.885	0.360	0.647	.375	
07	06	0.655	0.633	0.848	0.952	0.420	0.710	.438	08
08	07				1.018	0.480	0.773	.500	
09	08	0.707	0.685	0.911	1.084	0.550	0.835	.563	09
10	09				1.148	0.610	0.897	.625	10
11	10	0.733	0.711	0.973	1.211	0.67	0.959	.688	12
12	11				1.273	0.73	1.021	.750	
13	unused								
14	12	0.785	0.763	1.036	1.400	0.86	1.083	.875	15
15	unused								
16	13	0.811	0.789	1.098	1.539	0.99	1.145	1.000	19

Notes

1. Minimum backshell size set with the condition:

$$A \text{ thread (major diameter)} > \text{dim.} J$$

Minimum backshell size is set because a large cable entry code can be used with a large cable diameter. The cable may be so large that it will not fit into smaller backshell sizes.

2. Light gray shade is for informational data only. Provided for ease of cross referencing. Shall not be a requirement. Shall not override or take precedent over any other requirements. Typical commercial cable entry size (Typ. Comm C. E. Code) are the commonly used sizes used at the inception of the this specification. The accuracy and consistency of these numbers are not guaranteed and should always be verified.
3. Passing a cable of the cable entry code diameter may be tight even on a straight backshell. Chances of successfully passing the cable may be marginal. The bend in a 45° or 90° backshell can further reduce the chances of passing a cable.

Design 1.1 - Environmental

This design shall be Category 2C in accordance with SAE AS85049.

TABLE VI. Design 1.1 details.

Strain relief style	M Ref
C	.450
N	.220

Design 1.2 - EMI

This design shall be Category 3C in accordance with SAE AS85049.

TABLE VII. Design 1.2 details.

Strain relief style	M Ref
C	.430
N	.150

Design 1.3 – Environmental EMI

This design shall be Category 2C in accordance with SAE AS85049.

TABLE VIII. Design 1.3 details.

Strain relief style	M Ref
C	.860
N	.580

Design 1.ATABLE IX. Design 1.A details.

Informational	Cable Entry Code	Design 1.A.1	Design 1.A.2
Typ. Comm C. E. Code		G, max.	
unused	01	unused	
01	02	0.702	0.802
02	03		
03	04		
04	05	0.764	0.864
05	06		
06	07	0.826	0.926
07	08		
08	09	0.889	0.989
09	10		

Notes:

1. Light gray shade is for informational data only. Provided for ease of cross referencing. Shall not be a requirement. Shall not override or take precedent over any other requirements. Typical commercial cable entry size are the commonly used sizes used at the inception of this specification. The accuracy and consistency of these numbers are not guaranteed and should always be verified.

Design 2– Banding Platform Adapter

This design shall be Category 2C in accordance with SAE AS85049.

Valid strain relief styles are B, K. All other styles are invalid for this design.

The banding platform shall be in accordance with MIL-DTL-32689.

Length (including standard length) only applies to straight connectors (not angled connectors (i.e. 45°)). The standard length is also the minimum length and is .750 for all sizes. Standard length is given for information only. Length shall be specified in the part number for straight backshells (even with the standard length) and omitted for other backshells.

TABLE X. Design 2: Dimensions based on backshell size.

Cable Entry Code (16 th of nominal max wire/cable O.D.)	Minimum backshell size	N +/- .015
01	unused	
02	06	0.125
03		0.188
04		0.250
05	07	0.312
06		0.375
07	08	0.438
08	09	0.500
09	10	0.562
10	12	0.625
11	15	0.688
12		0.750
13		0.812
14		0.875

Notes

1. Minimum backshell size set with the condition:

$$A \text{ thread (major diameter)} > \text{dim. } N$$

Minimum backshell size is set because a large cable entry code can be used with a large cable diameter. The cable may be so large that it will not fit into smaller backshell sizes.

2. Passing a cable of the cable entry code diameter may be tight even on a straight backshell. Chances of successfully passing the cable may be marginal. The bend in a 45° or 90° backshell can further reduce the chances of passing a cable.

Design 3 – Strain Relief Clamp

This design shall be Category 4C in accordance with SAE AS85049.
Valid strain relief style is C. All other styles are invalid for this design.
Dimensions H and L shall be in accordance with Design 1.

TABLE XI. Design 3: Dimensions based on backshell size.

Informational			Backshell Size.	Cable Entry Code	P Max.	R Max
Shell size	A Thread	Typ. Comm. Bk. Size				
08	.3750-32	11	06	03	0.688	0.625
09	.4375-28	07	07	04		0.688
10	.5000-28	08	08	05		0.688
11	.5625-24	09	09	05	0.750	0.750
12	.6250-24	10	10	06		0.875
15	.7500-20	13	12	07		0.875
18	.9375-20	14	15	08		1.000
23	1.1875-18	17	19	14		1.125

Notes:

1. Light gray shade is for informational data only. Provided for ease of cross referencing. Shall not be a requirement. Shall not override or take precedent over any other requirements. Typical commercial backshell size and typical commercial cable entry codes are the commonly used sizes used at the inception of this specification. The accuracy and consistency of these numbers are not guaranteed and should always be verified.
- 2.

Design 1, saddle clamp figure and dimensions shall apply. For cable entry code 14, dimensions shall be:

TABLE XII. Design 3: Cable entry code 14 dimensions.

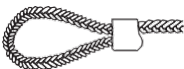
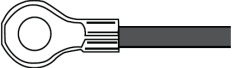
Cable Entry Code	L	J	H
14	.869	.860	1.400

Design 4 – Shorting Cap

This design shall be Category 2C in accordance with SAE AS85049.

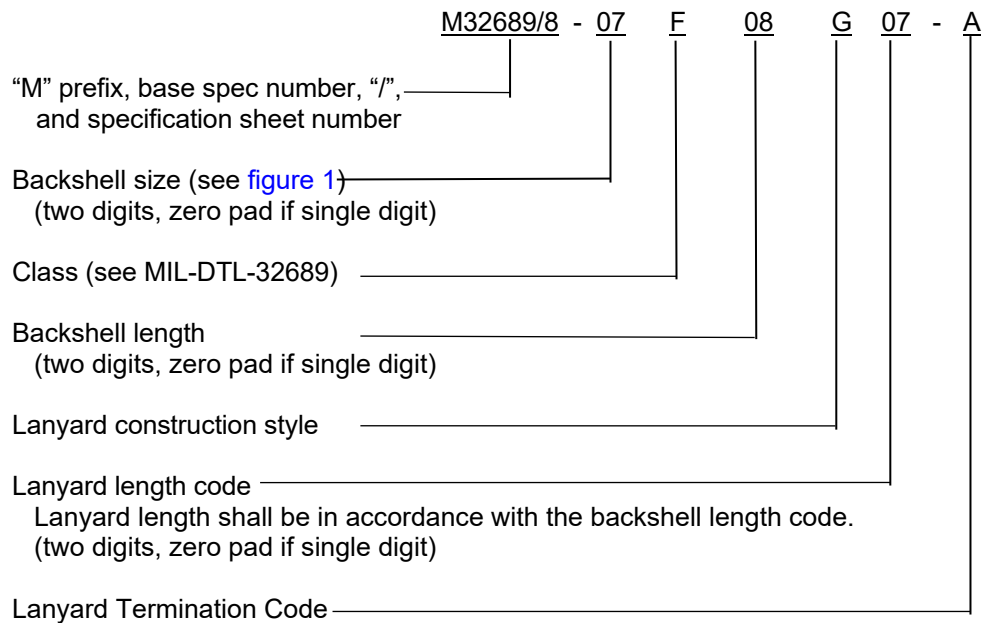
Strain relief style is not applicable to this design.

TABLE XIII. Design 4: lanyard construction style.

Lanyard Construction Style	Description	Picture	Detailed Description
C	No Attachment, Body Strap Only		
D	Bead Chain, Cres/Passivate, with Terminal		
E	Link Chain, Cres/Passivate, with Reverse Link		
F	Wire Rope, Nylon Jacket with Terminal		
G	Nylon Rope, with Terminal		-55° to +100°C., black, very flexible, very good abrasion resistance, good resistance to fuels, 0.120" (3mm) diameter
K	Nylon Rope with Slip Knot for Termination (can be used to attach shorting cap to cables)		
H	SST Wire Rope, Fluoropolymer Jacket		Translucent FEP jacket over stainless steel, -65° to +200°C., fair flexibility, good abrasion resistance, .100" diameter
N	No Lanyard		
R	Wire Rope, Fluoropolymer Jacket, with Terminal		
S	#8 Sash Chain, Cres/Passivate		Stainless steel, #8 chain, 0.240" (6mm)
U	SST Wire Rope, Polyurethane Jacket		Black polyurethane over stainless steel rope, -65° to +125°C., very flexible, excellent abrasion resistance, excellent resistance to fuels, .080" (2mm) diameter

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Design 4: Part or Identifying Number (PIN) for Design 4 example:



End of Design 4

Referenced documents. In addition to MIL-DTL-32689, this document references the following:

SAE AS85049
AMS-QQ-P-35
ASTM A967/A967M
AMS 2700

CONCLUDING MATERIAL

Custodians:
Army – CR
Navy - AS
Air Force – 85
DLA - CC

Preparing activity:
DLA - CC
(Project 5935-2022-026)

Review activities:
Navy - EC, MC

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.