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AEROSPACE RECOMMENDED PRACTICE

ARP 1308A

Issued	July 1975
Revised	October 1977

PREFERRED ELECTRICAL CONNECTORS FOR AEROSPACE VEHICLES AND ASSOCIATED EQUIPMENT

1. PURPOSE

This Aerospace Recommended Practice (ARP) serves as a guide toward standard practice for the selection and use of preferred electrical connectors for aerospace vehicles and associated equipment.

1.1 Scope: The intent of this ARP is to identify selected electrical connectors, their general application characteristics, and associated configuration options recommended for new design, repair, and retrofit purposes (see 6.1). It is acknowledged that those connectors listed herein will not completely satisfy all aerospace vehicle and equipment requirements but optimization of the use of these components will facilitate standardization in the form of maximum utilization of a minimum variety of connectors.

1.2 Classification: Electrical connectors shall be classified in accordance with the connector geometric configuration, size (see 6.2) and coupling method or usage as follows:

Class	Description
1	Cylindrical, Standard, Threaded Coupling
2	Cylindrical, Miniature, Bayonet Coupling
3	Cylindrical, Miniature, Threaded Coupling
4	Cylindrical, Subminiature, Bayonet Coupling
5	Rectangular, Miniature, Rack and Panel
6	Rectangular, Subminiature, General Purpose

1.3 Application: Cylindrical connectors, threaded and bayonet coupling, are intended for cable-to-panel applications. Rectangular connectors are intended for rack-to-panel and cable-to-panel/rack applications. ø

2. APPLICABLE DOCUMENTS

The following documents shall form a part of this ARP to the extent specified herein. The applicable issue of each shall be that in effect on the date of this document unless otherwise specified in the manufacturer's detail specifications. Supplemental specifications, standards, or the like, which by reference in any of the following publications are indicated to be part thereof, shall not be considered effective except as specifically stated in the manufacturer's detail specification or as may be otherwise mutually agreed upon between the vendor and the purchaser.

2.1 Military Specifications:

MIL-C-5015	Connectors, Electric, AN Type, General Specification for
ø MIL-C-24308	Connectors, Electric, Rectangular, Miniature, Polarized Shell, Rack and Panel, General Specification for
MIL-C-26482	Connectors, Electric, Circular, Miniature, Quick Disconnect, Environment Resisting, General Specification for

2.1 (Continued)

MIL-C-26500	Connectors, General Purpose, Electric, Miniature, Circular, Environment Resisting, General Specification for
MIL-C-38999	Connectors, Electric, Circular, Miniature, High Density, Quick Disconnect, Environment Resistant, Removable Crimp Contacts
MIL-C-39029	Contacts, Electric, General Specification
MIL-C-81659	Connectors, Electrical, Rectangular, Crimp Contacts, General Specification for
MIL-I-81969	Installing and Removal Tools, Connector Electrical Contact, General Specification for
MIL-C-83723	Connector, Electric, Circular, Environment Resisting, General Specification for
MIL-C-83733	Connectors, Electrical, Miniature, Rectangular Type, Rack to Panel, Environment Resisting, 200°C Total Continuous Operating Temperature, General Specification for

2.2 Military Standards:

MIL-STD-1344	Test Methods for Electrical Connectors
ø MIL-STD-1554	Insert Arrangements for MIL-C-83723 Series III and MIL-C-26500 Environment Resisting, Circular, Electrical Connectors
MIL-STD-1560	Insert Arrangements for MIL-C-38999 and MIL-C-27599 Electrical, Circular Connectors
MIL-STD-1646	Servicing Tools for Electric Contacts and Connections, Selection and Use of
MIL-STD-1651	Insert Arrangements for MIL-C-5015, MIL-C-22992 (Classes C, J and R), and MIL-C-83723 (Series II) Electrical Connectors
MIL-STD-1669	Insert Arrangements for MIL-C-26482 Environment Resisting, Circular, Electrical Connectors

2.3 Society of Automotive Engineers Publications:

ARP 914	Glossary of Electrical Connection Terms

3. REQUIREMENTS

3.1 General: The qualification, materials, design, construction, intermateability, interchangeability, and performance requirements applicable to preferred electrical connectors specified in this ARP shall be in accordance with those requirements of the military specification referenced for each particular connector specified herein.

3.2 Class 1 Electrical Connectors: Class 1 electrical connectors shall, as a minimum, have the following application characteristics:

a) Coupling method: Threaded
b) Shell sizes: 14S, 20, 28, 36
ø c) Contact sizes: 12, 16
d) Contact termination: Crimp
e) Contact retention: Rear insertion/extraction
f) Usage characteristics: Temperature range: -65°C to +175°C (Class L); -65°C to +200°C (Class W); Environment resisting; Fluid resisting; Conductive finish
g) Configurations: Per Table I, herein

3.3 Class 2 Electrical Connectors: Class 2 electrical connectors shall, as a minimum, have the following application characteristics:

a) Coupling method: Bayonet
b) Shell sizes: 8, 10, 12, 14, 16, 18, 22, 24
ø c) Contact sizes: 12, 16, 20
d) Contact termination: Crimp
e) Contact retention: Rear insertion/extraction
f) Usage characteristics: Temperature range: -55°C to +200°C (MIL-C-26482); -65°C to +200°C (MIL-C-83723); Environment resisting; Fluid resisting; Conductive finish
g) Configuration: Per Table II, herein

3.4 Class 3 Electrical Connectors: Class 3 electrical connectors shall, as a minimum, have the following application characteristics:

a) Coupling method: Threaded
b) Shell sizes: 8, 10, 12, 16, 18, 22
c) Contact sizes: 16, 20
d) Contact termination: Crimp
e) Contact retention: Rear insertion/extraction
f) Usage characteristics: Temperature range: -65°C to +200°C; Environment resisting; Fluid resisting; Conductive finish
g) Configuration: Per Table III, herein

3.5 Class 4 Electrical Connectors: Class 4 electrical connectors shall, as a minimum, have the following application characteristics:

a) Coupling method: Bayonet
b) Shell sizes: 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25
ø c) Contact sizes: 16, 20, 22D
d) Contact termination: Crimp
e) Contact retention: Rear insertion/extraction
f) Usage characteristics: Temperature range: -65°C to +200°C; Environment resisting, Fluid resisting, Conductive finish
g) Configuration: Per Table IV, herein. Series I connectors are of the extended shell, scoop-proof design, Series II connectors are of the low silhouette, non scoop-proof design. The Series I and II connectors are not interchangeable or intermateable.

3.6 Class 5 Electrical Connectors: Class 5 electrical connectors shall, as a minimum, have the following application characteristics:

a) Coupling method: Rack and panel, axial engage/disengage
b) Shell sizes: Single/dual insert accommodation (MIL-C-81659); A, B (MIL-C-83733)
ø c) Contact sizes: 12, 16, 20, 22 (MIL-C-81659), 22D (MIL-C-83733)
d) Contact termination: Crimp
e) Contact retention: Rear insertion/extraction
f) Usage characteristics: Temperature range: -65° C to +125° C (MIL-C-81659); -65° C to +200° C (MIL-C-83733); Environment resisting; Fluid resisting; Conductive finish
g) Configuration: Per Table V, herein

3.7 Class 6 Electrical Connectors: Class 6 electrical connectors shall, as a minimum, have the following application characteristics:

a) Coupling method: General purpose, axial engage/disengage
b) Shell sizes: 1 through 6
ø c) Contact sizes: 20, 22D
d) Contact termination: Crimp
e) Contact retention: Rear insertion/extraction
f) Usage characteristics: Temperature range: -55° C to +125° C; Non-environmental; Non fluid resisting; Conductive finish
g) Configuration: Per Table VI, herein

4. QUALITY ASSURANCE PROVISIONS

Quality assurance provisions applicable to electrical connectors specified in this ARP shall be in accordance with those provisions specified in the military specification referenced for each particular connector. Unless otherwise specified in the referenced military specification, testing of connectors shall be in accordance with MIL-STD-1344.

5. PREPARATION FOR DELIVERY

Preparation for delivery provisions applicable to electrical connectors specified in this ARP shall be in accordance with those provisions specified in the military specification referenced for each particular connector.

6. NOTES

6.1 Intended Use: Electrical connectors listed in this specification are intended for use in aerospace vehicles including military/commercial airplane and missile airframes, propulsion units, and associated avionics components. These connectors represent items primarily preferred for power, control, and instrumentation cable interconnection applications for new equipment designs and may be used for repair and retrofit purposes on existing equipments for those connector types listed in the tables herein under the "Intermates With" column.

6.2 Connector Size Classification: Connector size infers the ratio of the dimensional envelope and weight characteristics of a connector configuration versus the typical spacing of contacts, or concentration, contain within the connector insert (oftimes designated as "density"). For specific details, see the governing military specification which defines each class of connectors.

6.3 Part Numbers: Part numbers assigned to electrical connectors are in accordance with the military specification sheets or MS drawings referenced for specific connector configurations specified in this Recommended Practice. Part numbers are limited to those configurations, classes, shell sizes, and insert arrangements and positions specified in the tables of this document.

6.4 Terminology: Terminology utilized herein is in accordance with ARP 914.

6.5 Marginal Indicia: The phi (ø) symbol is used to indicate where technical changes have been made in this recommended practice from the previous issue.

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TABLE I

Class 1, Cylindrical, Standard, Threaded Coupling Connector Configurations[1]

CONNECTOR DESCRIPTION	MILITARY SPECIFICATION			INTERMATES WITH:	INSERT ARRANGEMENT[2]			
	NUMBER	CLASS	MS DWG		SHELL SIZE	MIL-STD-1651 SECT.	MIL-STD-1651 ARR. NO.	QTY/SIZE CONTACTS
Receptacle Wall Mounting	MIL-C-5015	W, L	MS3450	MIL-C-5015, All Classes	14S	40	2	4/16
					20	70	15	1/12
					28	100	2	12/16, 2/12
Receptacle Box Mounting	MIL-C-5015	W, L	MS3452	MIL-C-5015, All Classes	28	100	21	37/16
					36	120	10	48/16
Receptacle, Jam Nut Mtg	MIL-C-5015	W, L	MS3454	MIL-C-5015, All Classes				
Plug, Cable	MIL-C-5015	W, L	MS3456/ MS3459[3]	MIL-C-5015, All Classes				

1. Connector hardware is in accordance with the following: pin contacts, MIL-C-39029/29; socket contacts, MIL-C-39029/30; grommet sealing plugs, MS3187, protective covers, MS25042/MS25043; contact crimping tools, MIL-STD-1646 or contact specification; and contact installing/removal tools, MIL-I-81969/14. See military specification for rear-end accessory hardware.

2. Normal insert position and first alternate position only are preferred.

3. MS3459 self-locking coupling mechanism preferred for high vibration/physical shock applications.

ø TABLE II

Class 2, Cylindrical, Miniature, Bayonet Coupling Connector Configurations[1]

CONNECTOR DESCRIPTION	MILITARY SPECIFICATION			INTERMATES WITH:	INSERT ARRANGEMENT[2]			
	NUMBER	CLASS	MS DWG		SHELL SIZE	MIL-STD-1669		QTY/SIZE CONTACTS
						SECT.	ARR. NO.	
Receptacle, Flange Mtg	MIL-C-26482, Series 2	L	MS3470	MIL-C-26482; Series 1 and 2, All Classes	10	20	6	6/20
					14	40	12	4/16, 8/20
					14	40	19	19/20
					18	60	32	32/20
Receptacle Sgl. Hole Mtg	MIL-C-26482, Series 2	L	MS3474	MIL-C-26482; Series 1 and 2, All Classes	22	80	55	55/20
					24	90	61	61/20
Plug, Cable	MIL-C-26482; Series 2	L	MS3476	MIL-C-26482; Series 1 and 2, All Classes				

1 Connector hardware is in accordance with the following: pin contacts, MIL-C-39029/4; socket contacts, MIL-C-39029/5; grommet sealing plugs, MS3187; contact crimping tools, MIL-STD-1646 or contact specification; and contact installing/removal tools, MIL-I-81969/14. See military specification for rear-end accessory hardware.

2 Normal insert position and first alternate position only are preferred.

TABLE II (continued)

Class 2, Cylindrical, Miniature, Bayonet Coupling Connector Configurations[1]

CONNECTOR DESCRIPTION	MILITARY SPECIFICATION			INTERMATES WITH:	INSERT ARRANGEMENT[2]			
	NUMBER	CLASS	SPEC SHEET		SHELL SIZE	MIL-STD-1554 SECT.	MIL-STD-1554 ARR. NO.	QTY/SIZE CONTACTS
Receptacle, Flange Mtg, Socket Contact	MIL-C-83723, Series 3	R	MIL-C-83723/71	MIL-C-26500; Type B; Class R, F	8	10	3	3/20
					12	30	12	12/20
					14	40		4/12
					16	50	24	24/20
Receptacle, Flange Mtg, Pin Contact	MIL-C-83723, Series 3	R	MIL-C-83723/72	MIL-C-26500; Type B; Class R, F	18	60	31	31/20
					22	80	19	19/16
					22	80	55	55/20
					24	90	61	61/20
Receptacle, Sgl. Hole Mtg, Socket Contact	MIL-C-83723, Series 3	R	MIL-C-83723/73	MIL-C-26500; Type B; Class R, F				
Receptacle, Sgl. Hole Mtg, Pin Contact	MIL-C-83723, Series 3	R	MIL-C-83723/74	MIL-C-26500; Type B; Class R, F				
Plug, Cable, Socket Contact	MIL-C-83723, Series 3	R	MIL-C-83723/75	MIL-C-26500; Type B; Class R, F				
Plug, Cable, Pin Contact	MIL-C-83723, Series 3	R	MIL-C-83723/76	MIL-C-26500; Type B; Class R, F				

1 Connector hardware is in accordance with the following: pin contacts, MIL-C-39029/4; socket contacts, MIL-C-39029/5; grommet sealing plugs, MS3187; contact crimping tools, MIL-STD-1646 or contact specification; and contact installing/removal tools, MIL-I-81969/14. See military specification for rear end accessory hardware.

2 Normal insert position and first alternate position only are preferred.

ø TABLE III

Class 3, Cylindrical, Miniature, Threaded Coupling Connector Configurations[1]

CONNECTOR DESCRIPTION	MILITARY SPECIFICATION			INTERMATES WITH:	INSERT ARRANGEMENT[2]			
	NUMBER	CLASS	SPEC SHEET		SHELL SIZE	MIL-STD-1554 SECT.	MIL-STD-1554 ARR. NO.	QTY/SIZE CONTACTS
Receptacle, Flange Mtg, Socket Contact	MIL-C-83723, Series 3	R	MIL-C-83723/82	MIL-C-26500; Type T, Class R, F	8	10	3	3/20
					10	20	5	5/20
					12	30	3	3/16
					12	30	7	7/16
Receptacle, Flange Mtg, Pin Contact	MIL-C-83723, Series 3	R	MIL-C-83723/83	MIL-C-26500; Type T, Class R, F	12	30	12	12/20
					16	50	24	24/20
					18	60	31	31/20
					22	80	19	19/16
Receptacle, Sgl. Hole Mtg, Socket Contact	MIL-C-83723, Series 3	R	MIL-C-83723/84	MIL-C-26500; Type T, Class R, F	22	80	55	55/20
Receptacle, Sgl. Hole Mtg, Pin Contact	MIL-C-83723, Series 3	R	MIL-C-83723/85	MIL-C-26500; Type T, Class R, F				
Plug, Cable, Socket Contact	MIL-C-83723, Series 3	R	MIL-C-83723/95	MIL-C-26500; Type T, Class R, F				
Plug, Cable, Pin Contact	MIL-C-83723, Series 3	R	MIL-C-83723/96	MIL-C-26500; Type T, Class R, F				

1 Connector hardware is in accordance with the following: pin contacts, MIL-C-39029/4; socket contacts, MIL-C-39029/5; grommet sealing plugs, MS3187; contact crimping tools, MIL-STD-1646 or contact specification; and contact installing/removal tools, MIL-I-81969/14. See military specification for rear-end accessory hardware.

2 Normal insert position and first alternate position only are preferred.

ø TABLE IV

Class 4, Cylindrical, Subminiature, Bayonet Coupling Connector Configurations[1]

CONNECTOR DESCRIPTION	MILITARY SPECIFICATION			INTERMATES WITH:	INSERT ARRANGEMENT[3]			
	NUMBER	SERIES, CLASS	MS DWG		SHELL SIZE[2]	MIL-STD-1560 SECT.[4]	MIL-STD-1560 ARR NO.	QTY/SIZE CONTACTS
Receptacle, Wall Mounting	MIL-C-38999	I;T	MS27656	MIL-C-38999;	9/8	101/201	-98	3/20
		II;T	MS27497	Series I and II,	9/8	101/201	-35	6/22D
				All Classes	11/10	102/202	-98	6/20
					11/10	102/202	-35	13/22D
Receptacle, Box Mounting	MIL-C-38999	I;E	MS27505	MIL-C-38999;				
		II;E	MS27508	Series I and II,	13/12	103/203	-98	10/20
				All Classes	15/14	104/204	-5	5/16
					15/14	104/204	-35	37/22D
Receptacle, Jam Nut Mtg	MIL-C-38999	I;T	MS27468	MIL-C-38999;				
		II;T	MS27474	Series I and II,	17/16	105/205	-8	8/16
				All Classes	17/16	105/205	-26	26/20
					17/16	105/205	-35	55/22D
Plug, Cable	MIL-C-38999	I;T	MS27467	MIL-C-38999;	19/18	106/206	-32	32/20
		II;T	MS27473	Series I and II,	19/18	106/206	-35	66/22D
				All Classes	21/20	107/207	-16	16/16
					21/20	107/207	-41	41/20
					21/20	107/207	-35	79/22D
					23/22	108/208	-21	21/16
					22	208	-55	55/20
					23	108	-53	53/20
					23/22	108/208	-35	100/22D
					25/24	109/209	-61	61/20
					25/24	109/209	-35	128/22D

1 Connector hardware is in accordance with the following: Pin contacts, MIL-C-39029/58; socket contacts, MIL-C-39029/56, /57; grommet sealing plugs, MS27488; protective covers, MS27501/MS27502; contact crimping tools, MIL-STD-1646 or contact specification; and contact installing/removal tools, MIL-I-81969/14. See military specification for rear-end accessory hardware.

2 Odd numbered sizes are for Series I connectors; Even numbered shell sizes designate Series II connectors.

3 Normal insert position and the first alternate position only are preferred.

4 Section 101 through 109 refers to Series I connectors; Section 201 through 209 refers to Series II connectors.