

Revision Table

Revision	Reason for Revision	Section	DCRN Number	Date
R	Page 6 – Was: 2024-T351 Aluminum Is: 2024-T351, T3510, T3511 Aluminum Page 7 – added “Note: Materials highlighted in table below in Red are inactive for new design” Page 7 to 10 - Added column “NEW SPECIFICATION” for all the listed materials. New materials added to match with M-516. Restricted materials are highlighted in Red. Page 10 to 13 – Plastics, Upholstery & Miscellaneous Material sections added to the list to match with M-516. Page 14 to 16 – Lists of restricted materials from MIL-STD-1587 & MMPDS are tabulated.	N/A	131880	09/09/2018
T	Page 26 – added “K- PH13-8MO Condition H1050” to third digit material code to Stainless Steel specifications.	N/A	132230	02/07/2019
U	Page 24 – added “B – 2024-T6” and Page 8 added “SAE AMS 4013” to laminated shim.	N/A	140712	10/07/2020
V	Deleted Title page Reduced Revision History to 3 years Reformatted Revision History to current template Changed Headers from Goodrich to Collins Aerospace Re formatted (Entire Document) font to Times New Roman 12pt where practical Added Purpose and Scope per new template Reformatted all section number Re-arranged Reference Docs to order Local Docs, Collins Docs, GT Docs. Removed Reference to 1.4.0, 1.5.0, 1.5.0.8, 1.5.0.12, as they are not referenced in document. Added Record section Added GT section	N/A N/A N/A N/A N/A 1.0, 2.0 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0,12.0 3.0 13.0 14.0	141048	05/06/2021

**Check the revision level in Dataworks screen ECN-R-Z07.
Verify that this is the correct revision before use.**

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W	Added Code L to section 5.4	5.4	141174	07/19/2021
Y	Added stainless steel '302' detail material code	5.4	141118	08/20/2021
	Standardized color codes for plastics	5.6		
	Clarified sheer size procedure	5.6		
	Added 'not applicable' options for plastic designations	5.6		
	Clarified that alternate names for Fluoroplastics include TFE, PTFE	5.6		
	Removed foam stipulation for foam/rubber '61' and '62' combinations	5.7		
	Added stainless steel '302' detail material code			
	Corrected formatting and dates of previous revision.	N/A		

1.0 Purpose

The purpose of this document is to provide guidance for selection of approved materials used in Collins Aerospace Interiors – Colorado Springs (COS) Seating and Mission Systems – COS. This document also provides instructions for assigning part numbers for raw materials used. New material codes can be created by design engineers and once checked, entered into the ERP system by the data entry clerk

2.0 Scope

This procedure is applicable to Collins Aerospace Colorado Springs (COS) Quality Management System (QMS). Engineering is responsible for ensuring this document is maintained.

Mission Systems level documents are not controlled by this procedure and are maintained in the Mission Systems Process Asset Library (PAL) per MIS-PRO-0001.

3.0 Reference Documents

- Small Part Guidance -1.4.35.8
- Control of Record – 1.16.1
- REACh Guidance – UTAS-ENG-GUI-0147
- Mission Systems Process Asset Library - MIS-PRO-0001
- Third Party Relationship Management - GT-PRO-3200
- Sanctions, Embargoes and Screening - GT-PRO-3400
- Jurisdiction Classification - GT-PRO-4100
- Harmonized System Classification - GT-PRO-4200
- DoD Design Criteria Standard: Material and Process Requirements for Aerospace Weapons Systems - MIL-STD-1587
- Metallic Materials Properties Development and Standardization Handbook - MMPDS

4.0 Materials

To increase survivability in the event of a crash, transport seats will be designed to use ductile materials that can absorb some energy and reduce the chance of brittle failure. Ejection seats generally are designed with materials having a high strength to weight ratio so that weight is minimized yet sufficient strength exists to withstand ejection/crash forces.

The Design Engineer has the responsibility and authority to choose any material they feel appropriately meets the parts requirements for both performance and cost. The items discussed below are offered as guidance; the engineer is strongly encouraged to use the materials listed for structural components. In addition to the selection process presented herein, the designer should carefully review the customer's requirements to determine customer limitations on material selection. Certain specialty metals are covered by the Berry Amendment which has special processing requirements. The project engineer should coordinate with the Program Manager or Contract Administrator to determine if the Berry Amendment applies.

To support REACh and Collins Aerospace MOC restrictions, all new designs will use materials that comply with current customer contracts. Collins Aerospace identified MOCs should be taken into account, and eliminated from new designs wherever feasible. The list of Collins Aerospace MOCs is all-encompassing of REACh restrictions, and can be found in UTAS-ENG-GUI-0147.

4.1. Metallic Materials**Commonly used materials for transport seats are:**

- 2024 Aluminum with a T3 or T4 type temper,
- 6061 Aluminum with a T6 temper if welding is required,
- 17-4, Stainless Steel (Plate, Rod, and Bar Stock) Note: 15-5PH is recommended for new designs when the applied load is perpendicular to the grain direction.
- 17-7 Stainless Steel (Sheet) and 300 Series Stainless Steel
- 15-5PH Stainless Steel (Bar) Material Restriction: As-solution heat treated thickness shall not exceed 12.000 inches.
- PH13-8Mo Stainless Steel (Bar)
- 4130 Steel in the Normalized (90-95 ksi ultimate strength) condition or F (125-140 ksi) heat treated condition if slightly higher strength is required. (Note: Please review Section 2.8 Corrosion Protection prior to choosing 4130 steel as a material.)

Commonly used materials for ejection seats are:

- 7075-T6 Aluminum (sheet metal .032 to .080 thickness only) – Use for high strength to weight ratio applications
- 7075-T76 Aluminum (sheet metal .080 - .250 thickness only) – Use for high strength to weight ratio applications
- 7075-T7351 Aluminum (Plate, Rod, and Bar Stock For Machining) – Use for high strength to weight ratio applications
- 7050-T7451 Aluminum (Plate) – Use for very high strength to weight ratio applications, stock thickness shall not exceed 2 inches
- 2024-T3 Aluminum (Sheet Metal) – Use for low stress components or components requiring ductility for energy attenuation
- 2024-T351, T3510, T3511 Aluminum (Plate, Rod, and Bar Stock For Machining) – Use for low stress components or components requiring ductility for energy attenuation
- 6061 Aluminum (for ejection seat tooling or support equipment applications only)
- 17-4, Stainless Steel (Plate, Rod, and Bar Stock) Note: 15-5PH is recommended for new designs when the applied load is perpendicular to the grain direction.
- 17-7 Stainless Steel (Sheet) and 300 Series Stainless Steel
- 15-5PH Stainless Steel (Bar) Material Restriction: As-solution heat treated thickness shall not exceed 12.000 inches.
- PH13-8Mo Stainless Steel (Bar)
- 300 Series Stainless Steel (Sheet, Plate, Rod, and Bar Stock) – (Parachute Pitot assembly use only)
- 6AL-4V Titanium (Sheet, Plate, Rod, and Bar Stock) (Note: titanium should never be used in contact with cadmium) – Use for in lieu of steel in high strength to weight ratio requirement applications

Exact material selection should, if possible, be made from materials normally stocked by Collins Aerospace and listed in the Material Listing. Prior to selecting a material it is good practice to coordinate with purchasing to ensure the material is readily procurable. If it is necessary to add a new material, the Design Engineer should coordinate the material selection with Production Planning, Product Engineering, and Purchasing when entering it into the MRP system.

In an effort to help standardize material selection and support multi-site manufacturing of components, the following list of materials and processing specifications should be used whenever possible. Although this list is not all-inclusive, it provides a starting point for material selection and provides the necessary information to be listed on the drawing to properly specify the raw material. It is the responsibility of the engineer with design authority to select and specify the appropriate material, even if the material is not listed in this section. If additional information is required for the material properties and processing specification please reference the materials handbook MMPDS. (X:\Public\Specifications - Ref ONLY- see IHS for latest rev\Commercial - Gov't Specs & Stds\MMPDS-04 (OLD MIL-HDBK-5) metallic properties\MMPDS-XX) [XX = current revision].

Note: Materials highlighted in table below in Red are inactive for new design.

ALUMINUM		ALL SPECS ARE FROM SAE (OLD SPEC)	NEW SPECIFICATION
SHEET BARE, PLATE			
2024-0	Aluminum Sheet, Bare 2024-0	AMS-QQ-A-250/4	SAE AMS 4035
2024-T3	Aluminum Sheet, Bare 2024-T3	AMS-QQ-A-250/4	SAE AMS 4037
2024-T351	Aluminum Plate, Bare 2024-T351 (up to 2 inches thick)	AMS-QQ-A-250/4	SAE AMS 4037
2024-T4	Aluminum Sheet, Bare 2024-T4	-	SAE AMS 4477
5052-H32	Aluminum Sheet, Bare 5052-H32	AMS 4016	SAE AMS 4016
6061-0	Aluminum Plate, Sheet, Bare 6061-0	AMS 4025	SAE AMS 4025
6061-T4	Aluminum Sheet, Bare 6061-T4	AMS 4026	SAE AMS 4026
6061-T6, T651	Aluminum Plate, Sheet, Bare 6061-T6, T651 (up to 2 inches thick)	AMS 4027	SAE AMS 4027
7075-0	Aluminum Sheet, Bare 7075-0	AMS-QQ-A-250/12	SAE AMS 4044
7075-T6	Aluminum Plate, Sheet, Bare 7075-T6 (recommended usage only below 0.080 thick)	AMS-QQ-A-250/12	SAE AMS 4045
7075-T651	Aluminum Plate, Sheet, Bare 7075-T651	AMS-QQ-A-250/12	SAE AMS 4045
7075-T73, T7351	Aluminum Plate, Sheet, Bare (up to 2 inches thick)	AMS-QQ-A-250/12	SAE AMS 4078
7075-T76	Aluminum Plate, Sheet, Bare	-	SAE AMS 4315
7050-T7451	Aluminum Plate, Bare 7050-T7451 (up to 2 inches thick)	AMS 4050	SAE AMS 4050
7075-T7651	Aluminum Plate, Bare 7075-T7651	-	SAE AMS 4315
LAMINATED AL ALLOY		-	M22499/1-075 OR -077 OR BAC1534-251A OR SAE AMS 4013
SHEET CLAD			
2024-0	Aluminum Sheet, Clad 2024-0	AMS-QQ-A-250/5	SAE AMS 4461
2024-T3	Aluminum Sheet, Clad 2024-T3	AMS-QQ-A-250/5	SAE AMS 4462
6061-T4	Aluminum Sheet, Clad 6061-T4	AMS 4026	SAE AMS 4475
7075-0	Aluminum Sheet, Clad 7075-0	AMS-QQ-A-250/13	SAE AMS 4048
7075-T6	Aluminum Sheet, Clad 7075-T6 (recommended usage only below 0.080 thick)	AMS-QQ-A-250/13	SAE AMS 4049
BAR, ROD (ROUND / HEX)			
2024-0, T6	Aluminum Bar, Rod, Round / Hex 2024-0, T6 (Rolled, Drawn, Cold Finished)	AMS-QQ-A-225/6	SAE AMS-QQ-A-225/6
2024-T4, T351	Aluminum Bar, Rod, Round / Hex 2024-T4, T351 (Rolled, Drawn, Cold Finished)	AMS-QQ-A-225/6	SAE AMS-QQ-A-225/6

2024-0, T3, T3510, T3511	Aluminum Bar, Rod, Round / Hex 2024-0, T3, T3510, T3511 (Extruded)	-	SAE AMS-QQ-A-200/3
6061-T6	Aluminum Bar, Rod, Round 6061-T6 (Extruded)	AMS-QQ-A-200/8	SAE AMS 4150
6061-T6511	Aluminum Bar, Rod, Round 6061-T6511 (Extruded)	-	SAE AMS 4173
6061-T6	Aluminum Bar, Rod, Round 6061-T6 (Rolled)	AMS-QQ-A-225/8	SAE AMS 4117
7075-T651	Aluminum Bar, Rod, Round 7075-T651 (Rolled)		SAE AMS 4122
7075-T73, T7351	Aluminum Bar, Rod, Round 7075-T73, T7351 (Rolled)	AMS-QQ-A-225/9	SAE AMS 4124
7075-0	Aluminum Bar, Rod, Round 7075-0 (Extruded)	-	SAE AMS 4476
7075-T6	Aluminum Bar, Rod, Round 7075-T6 (Extruded)	-	SAE AMS 4154
7075-T73, T7311	Aluminum Bar, Rod, Round 7075-T73 (Extruded)	AMS-QQ-A-200/11	SAE AMS 4617
7075-T74	Aluminum 7075-T74 (Die And Hand Forgings)	AMS-4131	SAE AMS 4131
TUBE ROUND / SQUARE			
2024-T3	Aluminum Tube, Round 2024-T3	AMS 4088	SAE AMS 4088
2024-0, T3, T3510, T3511	Aluminum Extruded Tube 2024-0, T3, T3510, T3511		SAE AMS-QQ-A-200/3
6061-0	Aluminum Tube, Round 6061-0	AMS-QQ-A-200/8	SAE AMS 4160
8M9DO4	Extrusion	-	-
MS20001H12	Hinge Extrusion AL2024-T3511	-	SAE AMS-QQ-A-200/3
FORGING			
7075-T73	Aluminum Forging AL7075-T73	-	SAE AMS-A-22771
7049-T73	Aluminum Forging AL7049-T73	-	DMS 2099/DMS 1834 CLASS 1
CASTING			
A201-T7	Aluminum Casting A201	-	SAE AMS 4229

STEEL		(REF FOR HEAT TREAT STRENGTH)(OLD SPEC)	NEW SPECIFICATION
SHEET , STRIP, AND PLATE			
1095	Steel Sheet 1095 Spring Steel	AMS 5121 (UNS G10950, AISI 1095)	SAE AMS 5121
4130N	Steel Sheet 4130 Normalized-Condition N	AMS 6345 (UNS G41300, AISI 4130)	SAE AMS 6345
4130A	Steel Sheet 4130 Annealed-Condition A	AMS 6350 (UNS G41300, AISI 4130)	SAE AMS 6350
4340	Steel Sheet 4340 Annealed	AMS 6359 (UNS G43406, AISI 4340)	SAE AMS 6359
A-2 tool steel	Steel Tool A-2 Air Hardened (NOT FOR GENERAL USE)	ASTM A 681	ASTM A681
BAR, ROD, ROUND			
4130N	Bar, Rod, Round, Hex 4130 Normalized	AMS 6348 (UNS G41300, AISI 4130)	SAE AMS 6348
4130F	Steel Bar, Rod, Round, Hex Condition F (Quenched and Tempered- 125ksi)	AMS 6346	SAE AMS 6346
4140	Steel Rod, Round 4140	AMS 6349 (UNS G41400, AISI 4140)	SAE AMS 6349
4340	Steel Rod, Round 4340	AMS 6415 (UNS G43406, AISI 4340)	SAE AMS 6415
52100	Steel Rod, Round E52100 (Bearing Steel)	AMS 6440 (UNS G52986)	SAE AMS 6440
TUBE ROUND / SQUARE			

4130N	Steel Tube, Round / Square 4130N	AMS 6360 (seamless)	SAE AMS 6360
4130N	Steel Tube, Round / Square 4130N	AMS 6371 (mechanical)	SAE AMS 6371
4130N	Steel Tube, Round / Square 4130N	AMS 6373 (welded)	SAE AMS 6373
4140	Steel Tube, Round 4140	AMS 6381 (UNS G41400, AISI 4140)	SAE AMS 6381
4340	Steel Tube, Round 4340	AMS 6415 (UNS G43406, AISI 4340)	SAE AMS 6415

STAINLESS STEEL		(REF FOR HEAT TREAT STRENGTH) (OLD SPEC)	NEW SPECIFICATION
SHEET, PLATE			
301A	Stainless Steel, Sheet, Plate 301A (75 KSI)	AMS 5901	SAE AMS 5901
301 1/4H	Stainless Steel, Sheet 301 1/4 Hard (125 KSI)	AMS 5517	SAE AMS 5517
301 1/2H	Stainless Steel, Sheet 301 1/2 Hard (150 KSI)	AMS 5518	SAE AMS 5518
301 3/4H	Stainless Steel, Sheet 301 3/4 Hard (175 KSI)	AMS 5902	SAE AMS 5902
301 Full H	Stainless Steel, Sheet 301 Full Hard (185 KSI)	AMS 5519	SAE AMS 5519
302 Full H	Stainless Steel, Sheet 302 Full Hard	-	SAE AMS 5906
304	Stainless Steel, Sheet, Plate 304 (75 KSI)	AMS 5513	SAE AMS 5513
321	Stainless Steel, Sheet, Plate 321 (70 KSI)	AMS 5510	SAE AMS 5510
17-7 PH	Stainless Steel, Sheet, Plate 17-7 Cond A, TH1050	AMS 5528 (UNS S17700, AMS 2759/3)	SAE AMS 5528
PH15-7MO	Stainless Steel, Sheet, Plate PH15-7MO Cond A	AMS 5520 (UNS S15700)	SAE AMS 5520
BAR, ROD, ROUND / HEX			
303SE	Stainless Steel Bar, Rod, Round 303SE CRES	AMS 5641	SAE AMS 5641
SAE30303F	Stainless Steel Bar, Rod, Round SAE30303 CRES	-	SAE AMS 5738
304A	Stainless Steel Rod, Round 304 Annealed	AMS 5639	SAE AMS 5639
304	Stainless Steel Bar 304	-	SAE AMS 5857
316A	Stainless Steel Rod, Round 316 CRES Annealed	-	SAE AMS 5648
321A	Stainless Steel Rod, Round 321 CRES Annealed	-	SAE AMS 5645
416A	Stainless Steel Rod, Round 416 CRES Annealed	-	SAE AMS 5610
416A	Stainless Steel Rod, Round 416 CRES Annealed	-	SAE AMS 5620 OR ASTM A 314
12-9-2	Stainless Steel Rod, Round Maraging CRES	-	SAE AMS 5617
15-5PH	Stainless Steel Bar, 15-5PH Cond A, H1025, H1075, H1100, H1150	AMS 5659(UNS S17400, AMS 2759/3)	SAE AMS 5659
15-5PH	Stainless Steel Bar, 15-5PH Cond H900, H925	AMS 5659(UNS S17400, AMS 2759/3)	SAE AMS 5659
PH13-8Mo	Stainless Steel Bar, PH13-8Mo Cond A, H1000, H1025, H1050, H1100, H1150	AMS 5629	SAE AMS 5629
PH13-8Mo	Stainless Steel Bar, PH13-8Mo Cond H950	AMS 5629	SAE AMS 5629
17-4PH	Stainless Steel Bar, 17-4PH Cond A, H900, H925, H1025, H1075, H1100, H1150		SAE AMS 5643
TUBE ROUND			
304	Stainless Steel Tube, Round, 304 CRES	AMS 5560 (seamless)	SAE AMS 5560
304	Stainless Steel Tube, Round, 304 CRES	AMS 5565 (welded)	SAE AMS 5565
310	Stainless Steel Tube, Round, 310 CRES	-	ASTM A 312
316	Stainless Steel Tube, Round, 316 CRES	-	ASTM A249
321	Stainless Steel Tube, Round, 321 CRES	-	MIL-T-8808
321	Stainless Steel Tube, Round, 321 CRES	-	SAE AMS 5570
321	Stainless Steel Tube, Round, 321 CRES	-	SAE AMS 5557
17-4PH	Stainless Steel Tube, 17-4PH Cond A, H900, H925,	-	SAE AMS 5643

	H1025, H1075, H1100, H1150		
VENDOR PARTS			
440C	Stainless Steel	-	-
18-8	Stainless Steel	-	-
301	Stainless Steel	-	-
	Stainless Steel	-	ASTM-A313
302	Stainless Steel	-	ASTM A313, SAE AMS 5688
6061	Aluminum	-	ASTM B211

BRASS/BRONZE/COPPER		OLD SPECIFICATION	NEW SPECIFICATION
BAR, ROD, ROUND / HEX			
464 Navel Brass	Brass/Bronze/Copper Rod, Round / Hex Brass, 464 Naval Brass, 1/2 Hard,	UNS C46400	SAE AMS 4611
Phosphor Bronze	Brass/Bronze/Copper Rod, Round Phosphor Bronze, Composition A,	UNS C51000	SAE AMS 4625
Aluminum Bronze	Brass/Bronze/Copper Bar, Rod, Round Aluminum Bronze,	UNS C63000	SAE AMS 4640
Sintered Bronze	Brass/Bronze/Copper Rod, Round Sintered Bronze, Type I / Type II	ASTM B 438	ASTM B 438

TITANIUM		OLD SPECIFICATION	NEW SPECIFICATION
SHEET, PLATE			
6AL-4V	Titanium Sheet, Plate 6AL-4V	AMS 4911	SAE AMS 4911
BAR, ROD, ROUND / HEX			
6AL-4V	Titanium Bar, Bar (up to 4" thickness)	AMS 4928	SAE AMS 4928
6AL-4V	Titanium Bar, Solution Heat Treated And Aged	-	SAE AMS 4965
TUBE			
3AL-2.5V	Titanium Tubing, 3AL-2.5V	AMS 4945	SAE AMS 4945
SPRING			
13V-11CR-3AL	Titanium Alloy	-	SAE AMS 4917

PLASTIC		SPECIFICATION
SHEET		
Nylon 6/6	Nylon 6/6, Without Filler	PER L-P-410
Nylon 6/6	Nylon 6/6, Wear Resistant	PER L-P-410
PLATE		
PTFE	POLYTETRAFLUOROETHYLENE	SAE AMS 3667
NYLATRON GSM	Nylatron GSM Nylon Type 6 (PA6), MoS2 Filled	-
BAR, ROD, ROUND / HEX		
POM	Polyoxymethylene, 211 Black	ASTM D6778
POM	Polyoxymethylene, Group 01, Class 3, Grade 3	ASTM D6778
TUBE		
SPIRAL WRAP	Spiral Wrap	A-A-59602 TYPE III, CLASS I

UPHOLSTERY		SPECIFICATION
FABRIC/PANEL		

CLOTH, PARACHUTE, NYLON- RIP-STOP, TYPE I	PIA-C-7020
CLOTH, PARACHUTE, NYLON, TYPE I, LOW PERMEABILITY	PIA-C-44378
CLOTH, NYLON, TYPE III, CLASS 1	PIA-C-7219
CLOTH, NYLON, TYPE III, CLASS 3	PIA-C-7219
CLOTH, NYLON, RESINTREATED CLASS 2	PIA-C-3953
CLOTH, NYLON, DUCK, RESINTREATED, CLASS 1	PIA-C-3953
CLOTH, NYLON VINYL COATED, TYPE I, CLASS 2	PIA-C-20696
CLOTH NYLON MARQUISETTE	PIA-C-26643
16010810 COTTON-ARMY DUCK	CCC-C-419
AIRPLANE CLOTH	PIA-C-5646
POLYESTER MESH, STYLE 8080, FINISH 35	VENDOR: FABLOK MILLS INC
ALUMINIZED ARAMID TWILL, TYPE 1056	VENDOR: GENTEX CORP, CARBONDALE PA
CLOTH, ARAMID TWILL, TYPE 1056	
POLY 2500, BLACK, PER SAE AMS-STD-595 COLOR NO. 37038	VENDOR: LANGENTHAL-RURAL HALL, NC
FDI STYLE 370, TEFLON FABRIC	VENDOR: FABRIC DEVELOPMENT INC
HOOK	
HOOK TAPE, CLOSURE ELEMENT, HOOK, CLASS 2, SEW-ON TAPE	A-A-55126 (REV. B)
LOOP/PILE	
LOOP TYPE III, CLASS 1 OR 1A	PIA-T-5038
PILE, TAPE, CLOSURE ELEMENT, CLASS 2, SEW-ON TAPE	A-A-55126 (REV. B)
TAPE	
TAPE, NYLON, TYPE III, CLASS I OR IA	PIA-T-5038
TAPE, NYLON, TYPE V, CLASS 1	PIA-T-5038
TAPE, NYLON, TYPE III, CLASS 1	PIA-T-5038
TAPE, NYLON, TYPE IV, 1000 LB	PIA-T-5038
TAPE, TEXTILE NYLON, TYPE II, CLASS C, 58 LB	PIA-T-5608
TAPE, TEXTILE NYLON, TYPE I, CLASS E, 650 LB	PIA-T-5608
TAPE, NYLON, 180 LB	BALLY P-6265
TAPE, ARAMID, TYPE VI, CLASS 5, 1500 LB	PIA-T-87130
TAPE, ARAMID, TYPE VI, CLASS 6, 2500 LB	PIA-T-87130
TAPE, KEVLAR, TYPE I, CLASS 1, 250 LB	PIA-T-87130
TAPE, KEVLAR, TYPE VI, CLASS 3, 750 LB	PIA-T-87130
TAPE, GLASS CLOTH	MIL-I-19166
WEBBING	
NYLON WEBBING, TYPE I, CLASS 1	PIA-W-4088
NYLON WEBBING, TYPE II, CLASS 1	PIA-W-4088
NYLON WEBBING, TYPE XIII	PIA-W-4088
NYLON WEBBING, TYPE IV, CLASS 1 OR 1A	PIA-T-5038
NYLON WEBBING, TYPE III, CLASS 1	A-A-55242
NYLON WEBBING, TYPE II, CLASS 1	PIA-W-27265
NYLON WEBBING, CLASS 1, 1500 LB	PIA-W-5625
NYLON TUBE WEBBING	PIA-W-5625
KEVLAR WEBBING, TYPE X, CLASS 5, 4000 LB	PIA-T-87130
CORD	
KEVLAR/ARAMID BRAIDED CORD, TYPE IX, 2000LB	PIA-C-87129
KEVLAR CORD, 1500 LB, TYPE VIII	PIA-C-87129
ARAMID CORD, 4000 LB, TYPE X	PIA-C-87129

NYLON CORELESS CORD, 225 LB, TYPE IIA	PIA-C-5040
NYLON CORD, 550 LB, TYPE III	PIA-C-5040
NYLON CORD, 300 LB, TYPE XI	PIA-C-7515
NYLON CORD, 550 LB, TYPE II	PIA-C-7515
NYLON CORD, 750 LB, TYPE III	PIA-C-7515
CORD, EXERCISER ELASTIC, TYPE 3, SIZE .125"	DMS 2225
CORD, ELASTIC, TYPE I	MIL-C-5651
FOAM	
POLY SHEET FOAM	DMS 1929 TYPE I, CLASS 1, GRADE A
URETHANE FOAM WITH INTEGRALLY PIGMENTED INTEGRAL SKIN, HAIR CELL GRAIN	DMS1957, TYPE 2, CLASS SE
LABEL	
LABEL, TYPE VI, CLASS 5	MIL-DTL-32075
SCOTCHCAL WHITE 3650-10	-
SCOTCHCAL BLACK 3650-12	-
THREAD	
NYLON THREAD, TYPE I, CLASS A	A-A-59826
NYLON THREAD, TYPE II, CLASS A	A-A-59826
NYLON THREAD, TYPE I OR II, CLASS A	A-A-59826
KEVLAR THREAD, "TEX 40"	A-A-55220
KEVLAR THREAD, "TEX 120"	A-A-55220
KEVLAR THREAD, "TEX 60"	A-A-55220
WARP YARN, 1500 DENIER KEVLAR, TYPE 29, "TEX 800"	A-A-55220
THREAD, COTTON, TYPE IV	A-A-52094
THREAD, COTTON, TYPE I	A-A-52094
THREAD, COTTON, TYPE V	A-A-52094
THREAD, COTTON, TYPE 4B GLAZED	A-A-52094

MISCELLANEOUS	SPECIFICATION
ADHESIVE/SEALANT	
3M EC-847	-
3M VHB 5958FR	-
SAE AMS 3276 ADHESIVE OR BMS5-26 TYPE 2	SAE AMS 3276
BOSTIK 1125	-
DISPERSTAT A-50	-
THREAD LOCK: ASTM D5363	ASTM D5363
VC3 VIBRA-TITE	-
SEALING COMPOUND	SAE AMS-S-8802, TYPE 2, CLASS A
INSPECTION LACQUER TORQUE SEAL –DYKEM	-
LOCTITE 222 LOW STRENGTH THREAD LOCKING ADHESIVE OR EQUIVALENT	ASTM D5363 GROUP 03, CLASS 1, GRADE 1
LOCTITE 243 MEDIUM STRENGTH THREAD LOCKING ADHESIVE OR EQUIVALENT	ASTM D5363 GROUP 03, CLASS 1, GRADE 1
Eastman 910	-
Permabond 910	-
DP105 CLEAR ADHESIVE	-
SEALING COMPOUND	SAE AMS-S-8802 TYPE 2, CLASS B
RTV118	-

3M ADHESIVE NO. 847L	-
DMS 2082 CLASS B-1/2	DMS 2082
PART ADHESIVE, EPOXY (NON-ASBESTOS FILLER) REF. DEXTER CORP. HYSOL DIV., CITY OF INDUXTRY, CA #EA934NA, PART A/B	-
LOCTITE 271 HIGH STRENGTH THREAD LOCKING ADHESIVE OR EQUIVALENT	ASTM D5363 GROUP 02, CLASS 2, GRADE 1
LOCTITE 609 RETAINING COMPOUND OR EQUIVALENT	ASTM D5363 GROUP 04, CLASS 1, GRADE 1
GREASE	
MOLYKOTE 55 - DOW CORNING OR EQUIVALENT	AMS-G-4343
AEROSHELL 33MS OR EQUIVALENT	MIL-G-21164
GREASE	MIL-G-27617, TYPE I
COMPOSITES	
6 PLY LAMINATE OF NEOPRENE IMPREGNATED FIBERGLASS, EXCEPT THE TWO EXTERIOR PLYS TO HAVE POLYURETHANE ON EXTERIOR SURFACES	-
COATED FABRIC	MIL-T-52983
GLASS B-STAGE EPOXY IMPRG FABRIC	DMS 2127 TYPE 8
RUBBER	
SILICONE RUBBER SPONGE	SAE AMS 3195
MC16300004 RUBBER TUBE	-
EB260-60 EPDM - PARKER HANNIFIN	-
NITRILE RUBBER	-
WIRE	
MS20995 WIRE, SAFETY OR LOCK	-
17-7PH CRES WIRE	SAE AMS 5678
CRES SAFETY WIRE	SAE AMS 5687
321 CRES SAFETY WIRE	SAE AMS 5689
CABLE	
WIRE 3/64 DIA BARE, 1/16 DIA COATED, 7X7 CONSTRUCTION, TYPE 2, COMPOSITION B	MIL-DTL-83420
WIRE ROPE, FLEXIBLE, 3/32 DIA, ZINC COATED, 7X7 CONSTRUCTION, TYPE 1, COMPOSITION A	MIL-DTL-83420
CRES CABLE TYPE I COMP B	MIL-DTL-83420
CRES SAFETY CABLE	SAE AMS 5687
321 CRES SAFETY CABLE	SAE AMS 5689

Note: Restricted Material table from MIL-STD-1587 is listed in table below. These materials are restricted from use on Department of Defense (DoD) weapons systems. Any use of these materials requires specific approval from the cognizant engineering authority of the procuring activity.

Metal	Alloy	Temper	Mill products
Aluminum	7178	All	All
	7079	All	All
Aluminum	2014	All	All except wheel forgings
	2020	All	All
	2024	-T8XX	Forgings
	7XXX	-T6XX	Extrusion over 0.250 inch thick and all bar, plate, and forgings
	7XXX	Overaged <u>1/</u>	
Alloy Steel	4340	200 to 260 ksi	All
	4340	260 to 280 ksi	All except for constant diameter pins and shafts
	4330M	Above 240 ksi	All
	H-11	Above 240 ksi	All
	4130	Above 180 ksi	All
	4140	Above 180 ksi	All
Corrosion Resistant Steel	D6AC	All ksi	All
	431	All	All
	19-9DL, 9-9 DX	All	All
	17-4PH, Cond H900/925	All	All
	17-7PH, Cond H900/RH950	All	All
	Custom 445, Cond H900/950	All	All
	Maraging steel, annealed	All	All
	15-5PH, Cond H900/925	All	All
	PH 13-8 Mo, Cond H950	All	All
	400 Series, 150-180 ksi	All	All
PH CRES Cond A	All	All	
303, 303S, 303SE	All	All	

1/ Shall be equal to or exceed 25 ksi stress corrosion cracking threshold resistance in short transverse direction in order to be used in aircraft structure.

Below is the list of materials with ratings listed from MMPDS. The materials rated “D” should not be used for new design as it fails to meet the criteria.

Table 3.1.2.3.1(a). Resistance to Stress Corrosion Ratings* for High-Strength Aluminum Alloy Products

Alloy and Temper ^b	Test Direction ^c	Rolled Plate	Rod and Bar ^d	Extruded Shapes	Forging
2013-T6511	LT	e	e	A	e
2014-T6	L	A	A	A	B
	LT	B'	D	B'	B'
	ST	D	D	D	D
2024-T3, T4	L	A	A	A	e
	LT	B'	D	B'	e
	ST	D	D	D	e
2024-T6	L	e	A	e	A
	LT	e	B	e	A'
	ST	e	B	e	D
2024-T8	L	A	A	A	A
	LT	A	A	A	A
	ST	B	A	B	C
2124-T8	L	A	e	e	e
	LT	A	e	e	e
	ST	B	e	e	e
2219-T351X, T37	L	A	e	A	e
	LT	B	e	B	e
	ST	D	e	D	e
2219-T6	L	A	A	A	A
	LT	A	A	A	A
	ST	A	A	A	A
2219-T85XX, T87	L	A	e	A	A
	LT	A	e	A	A
	ST	A	e	A	A
6061-T6	L	A	A	A	A
	LT	A	A	A	A
	ST	A	A	A	A
7040-T7451	L	A	e	e	e
	LT	A	e	e	e
	ST	B	e	e	e
7049-T73	L	A	e	A	A
	LT	A	e	A	A
	ST	A	e	B	A
7049-T76	L	e	e	A	e
	LT	e	e	A	e
	ST	e	e	C	e
7050-T74	L	A	e	A	A
	LT	A	e	A	A
	ST	B	e	B	B
7050-T76	L	A	A	A	e
	LT	A	B	A	e
	ST	C	B	C	e
7075-T6	L	A	A	A	A
	LT	B'	D	B'	B'
	ST	D	D	D	D
7075-T73	L	A	A	A	A
	LT	A	A	A	A
	ST	A	A	A	A

Table 3.1.2.3.1(a). Resistance to Stress-Corrosion Ratings* for High-Strength Aluminum Alloy Products (Continued)

Alloy and Temper ^b	Test Direction ^c	Rolled Plate	Rod and Bar ^d	Extruded Shapes	Forging
7075-T74	L	"	"	"	A
	LT	"	"	"	A
	ST	"	"	"	B
7075-T76	L	A	"	A	"
	LT	A	"	A	"
	ST	C	"	C	"
7085-T7651 7149-T73	ST	C	"	"	"
	L	"	"	A	A
	LT	"	"	A	A
7175-T74	ST	"	"	B	A
	L	"	"	"	A
	LT	"	"	"	A
7475-T6	ST	"	"	"	B
	L	A	"	"	"
	LT	B ^e	"	"	"
7475-T73	ST	D	"	"	"
	L	A	"	"	"
	LT	A	"	"	"
7475-T76	ST	A	"	"	"
	L	A	"	"	"
	LT	A	"	"	"
	ST	C	"	"	"

^a Ratings were determined from stress corrosion tests performed on at least ten random lots for which test results showed 90% conformance with 95% confidence when tested at the following stresses:
^b A - Equal to or greater than 75% of the specified minimum yield strength. A very high rating. SCC not anticipated in general applications if the total sustained tensile stress* is less than 75% of the minimum specified yield stress for the alloy, heat treatment, product form, and orientation.
^c B - Equal to or greater than 50% of the specified minimum yield strength. A high rating. SCC not anticipated if the total sustained tensile stress* is less than 50% of the specified minimum yield stress.
^d C - Equal to or greater than 25% of the specified minimum yield stress or 14.5 ksi, whichever is higher. An intermediate rating. SCC not anticipated if the total sustained tensile stress* is less than 25% of the specified minimum yield stress. This rating is designated for the short-transverse direction in improved products used primarily for high resistance to exfoliation corrosion in relatively thin structures where applicable short-transverse stresses are unlikely.
^e D - Fails to meet the criterion for the rating C. A low rating. SCC failures have occurred in service or would be anticipated if there is any sustained tensile stress* in the designated test direction. This rating is currently designated only for the short-transverse

Hardware should be selected from the Standard Hardware List, if possible. On new designs all screws and bolts should have a 160 ksi minimum strength to prevent inadvertent mixing of similar looking but lower strength fasteners during assembly or maintenance.

The grip length of all screws and bolts should be such that no threads are in bearing in sheets or fittings with a thickness of .093 inches or less. In thicker sheets or fittings a maximum of two threads may be in bearing. If the grip length of the fastener is greater than the thickness of the materials being joined, no more than three washers may be used under the nut.

For ejection seats, the screw/bolt grip length should allow a minimum of two threads protruding from the nut.

Standard screws, nuts and bolts used on transport seats include:

- Pan head screws - NAS 623 (short thread) or NAS 601-604 (full length thread). Pan head screws should not be used to carry high tensile loads.
- Hex head bolts - NAS 6203-6208 or NAS 6603-6608. Good for shear and tensile loads.
- Flat head screws - NAS 1202-1205.
- Socket head fasteners. Good strength but high cost. Not recommended. (Use NAS1351 when required, i.e., A286 SS)
- Self-locking nut - MS21042.

- A cross reference is in development for Stainless Steel fasteners that can be used in place of alloy steel fasteners when required. Contact Design Engineering Management to obtain a copy of the draft list if needed.

For all transport seat structural joints in Aluminum which are in the primary load path, metal threaded inserts (“KEENSERTS”) shall be used. Helicoil inserts can be used for other transport seat joints which are not structural in nature. These types of joints include attachment of linkage, handles, etc. For attachment of non-structural transport seat components and for joints which are not critical to the safe operation of the transport seat, tapped holes in the parent material can be utilized.

Standard screws, nuts and bolts used on ejection seats include:

NAS673 Titanium Hex Bolts (high cost, high strength/weight ratio)

NAS 6203 – 6208 Cad Plated Steel Hex Bolts

NAS6703 Stainless Steel Hex Bolts

NAS600 - 606 Phillips Pan Full Thread Screw

NAS623 Cad Plated Steel Pan Head Short Thread Screw (light tensile load applications)

MS27039 Cad Plated Steel Pan Screw

MS27039C CRES Pan Screw

NAS1096 Cad Plated Steel Hex/Phillips Full Thread Screw

DCT7900P-10-A-2 Captive Screw

NAS1149D Aluminum Washer

MS21042N Self-locking nut

MS20470 Protruding Head Alum Rivet

MS20426 Flush Alum Rivet

NAS1097 Flush Alum Rivet (Only for applications where MS20426 countersink is too deep)

HL326 Hi-Lock Pin

MS21060 Stainless Steel Nut Plate (2 lug, low height, floating nut)

MS21062 Stainless Steel Nut Plate (1 lug, low height, floating nut)

MS21919WDG Clamp

NAS42DD Alum Spacer

NAS42HT Cad Plated Steel Spacer

NAS1057 CRES Spacer

For ejection seats, standard fasteners should be selected from the applicable aircraft standard parts list as well as from standard parts currently used on ejection seat products. For new seats, captive hardware should be used for all hardware removed for scheduled maintenance while the seat is installed in the cockpit. **Note:** Cadmium plated hardware shall never be installed in an application where the cadmium surface can contact titanium.

4.2. Non-Metallic Materials

All non-metallic materials used in Collins Aerospace seating products must meet without exception one or more of the following requirements of 14 CFR 25.853 for Seats certified to Part 25 (Transport Category Airplanes), 14 CFR 23.853 for Seats certified to Part 23 (Normal, Utility, Acrobatic, and Commuter Category Airplanes) , 14 CFR 27.853 for Seats certified to Part 27 (Normal Category Rotorcraft), and 14 CFR 29.853 for Seats certified to Part 29 (Transport

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Category Rotorcraft) Items such as small parts (knobs, handles, rollers, fasteners, clips, grommets, rub strips, pulleys, small electrical parts, electrical wire and cable insulation) that would not contribute significantly to the propagation of a fire are exempt from the above standards. Reference procedure 1.4.35.8 Small Part Guidance for applicable criteria.

Note: Materials in the followings table show compliance to 14 CFR 25.853 which would typically mean compliance to Parts 23, 27, and 29. It is the design engineer’s responsibility to verify compliance The design engineer should refer to the Flammability Database for flammability data of specific material combinations. X:\Engineering\Public\Flammability Test Data\Approved Flammability Database for selected materials.

Material Description	Collins Specification No.	Meets 14 CFR 25.853(a) Appendix F, Part I 12 Second or 60 Second Vertical	Meets 14 CFR 25.853(c) Appendix F, Part II Oil Burner	Meets 14 CFR 25.853(d) Appendix F, Part IV Heat Release	Meets 14 CFR 25.853(d) Appendix F, Part V Smoke Emissions & Airbus ADB0031 Toxicity
BMC	GMS-003	60 Second Compliant		Compliant	Compliant
Lexan F6000	N/A	12 Second Compliant		N/A	Compliant
Towflex 213110	N/A	60 Second Compliant		Compliant	Compliant
Radel 7700	N/A	60 Second Compliant		Compliant	Compliant
GE Ultem 1668A 71025	N/A	60 Second Compliant		Compliant	Compliant
Europlex PPSU 99460H	N/A	60 Second Compliant		Compliant	Compliant
MD12 Pyropel	N/A	12 Second Compliant		Not Tested	Compliant
Powder Coated Aluminum Supplied by Cardinal	N/A	60 Second Compliant		Compliant	Compliant
Boltaron	N/A	12 Second Compliant			
12K 2x2 Twill E-761 Supplied by Matrix Composites, Inc.	GMS-004	12 Second Compliant			
HR Polyurethane Foams Supplied by North Carolina Foams HR150, HR70, HR32, HR2855 Note: Requires Fireblocker		12 Second Compliant	Compliant with fireblocker		
Dunlop Carefoam DAX90, DAX55, DAX26		12 Second Compliant	Compliant without fireblocker		
4101 Ethafoam Note: Requires Fireblocker		12 Second Compliant	Compliant with fireblocker		
Safelite II		12 Second Compliant	Compliant without		

			fireblocker		
Ensolite Type M Note: Requires Fireblocker		12 Second Compliant	Compliant with fireblocker		
Fortron 1140L4		60 Second Compliant		Compliant	Compliant

5.0 Procedure for determining the Collins Aerospace 15 digit raw material part number

The first digit indicates the basic material:

- 1 - Aluminum
- 2 - Steel
- 3 - Stainless Steel
- 4 - Brass/Bronze/Copper
- 5 - Plastics and Non metals
- 6 - Foam and Rubber (for cushions, etc.)
- 7 - Adhesives, Electrical Wire and Other Supplies
- 8 - Finishes (Paint, Powder Coat, Primer, etc.)
- 9 - Fabric (including leather)
- T- Titanium

The second digit for metals and plastics (first digit codes 1-5) is a shape code such as:

- 1 - Sheet, bare
- 2 - Sheet, clad
- 3 - Plate
- 4 - Bar
- 5 - Rod, round
- 6 - Rod, hex
- 7 - Tube, round
- 8 - Tube, square or rectangular

The second digit for other materials is given with the specific materials.

The third digit is a detail material code for each material class. If the first digit is one then the third digit would give the material detail such as the following for aluminum:

- 1 - 2024-O
- 2 - 2024-T3 (includes all forms of T3, 351 or 3511, the exact form is usually tied to the geometry and can be detailed along with the ASTM code, etc. in the part's second description field in the ERP screen) and 2024T4.
- 3 - 5052 (-H32 for sheets unless otherwise specified)
- 4 - 6061-O
- 5 - 6061-T4
- 6 - 6061-T6
- 7 - 7075-T6
- 8 - 7075-O
- 9 - 7050-T7451
- A - 7075-T7351

The generic form becomes:

X - X - X - XXXX - XXXX - XXXX
Block: 1 2 3 4 5 6

5.1. *Specifics for Titanium*

The first digit for all titanium is T.

The second digit is the shape code:

- 1 - Sheet
- 3 - Plate
- 4 - Bar
- 5 - Rod, round
- 6 - Rod, hex
- 7 - Tube, round
- 8 - Tube, square or rectangular
- 9 -
- 0 -

The third digit gives the material detail:

- 1 - 6AL-4V per AMS 4928
- 2 - 6AL-4V per AMS 4911
- 3 - 3AL-2.5V per AMS 4945
- 4 -
- 5 -
- 6 -
- 7 -
- 8 -
- 9 -
- 0 -

Titanium Sheet - T1X-X.XXX (Ignore/delete all "-" or ".")

The first X gives the material detail, the last four the thickness in inches - X.XXX

Titanium Plate - T3X-X.XXX-XX.XX-XX.XX

The first X gives the material detail, the next four the thickness in inches - X.XXX, then the width in inches - XX.XX, and finally the length in inches - XX.XX.

NOTE: Plate must have all three dimensions, even sawn plate with a length of 48, 96 or 120 inches. NOTE: This should allow all "-OP5" plate to become truly raw material instead of "a specific part number-OP5".

Titanium Bar - T4X-X.XXX-X.XXX

The first X gives the material detail the next four the thickness in inches - X.XXX, then the width in inches - X.XXX.

Titanium Rod, Round - T5X-X.XXX

The first X gives the material detail and the next four the diameter in inches - X.XXX.

Titanium Rod, Hex - T6X-X.XXX

The first X gives the material detail and the next four the size in inches - X.XXX.

Titanium Tube, Round - T7X-X.XXX-X.XXX

The first X gives the material detail, the next four the diameter in inches - X.XXX, and then the wall thickness in inches - X.XXX.

Titanium Tube, Square or Rectangular - T8X-X.XXX-X.XXX-X.XXX

The first X gives the material detail, the next four the major nominal size in inches - X.XXX, then the minor nominal size - X.XXX, and then the wall thickness in inches - X.XXX.

5.2. Specifics for Aluminum

The first digit for all aluminum is 1. The second digit is the shape code:

- 1 - Sheet, bare
- 2 - Sheet, clad
- 3 - Sawn Plate Rectangles
- 4 - Bar
- 5 - Rod, round
- 6 - Rod, hex
- 7 - Tube, round
- 8 - Tube, square or rectangular
- 9 -
- A - Angles
- C - Channels
- E - Standard Extrusions, Other Shapes
- H - Honey Comb Core
- L - Laminated Shim Stock
- P - Panels (honey comb, etc.)

The third digit gives the material detail:

- 1 - 2024-O
- 2 - 2024-T3 (includes all forms of T3, 351 or 3511 - the exact form is usually tied to the geometry and can be detailed along with the ASTM code, etc. in the part description) and 2024T4.
- 3 - 5052 (-H32 for sheets unless otherwise specified)
- 4 - 6061-O
- 5 - 6061-T4
- 6 - 6061-T6
- 7 - 7075-T6
- 8 - 7075-O
- 9 - 7050-T7451
- A - 7075-T7351
- B - 2024-T6

Aluminum Sheet, Bare - 11X-X.XXX (Ignore/delete all "-" or ".")

The first X gives the material detail, the last four the thickness in inches - X.XXX. Sheet includes full sheets of plate with a thickness up to and including 0.313 inches.

Aluminum Sheet, Clad - 12XXXXX

Same as above.

Aluminium Plate - 13X-X.XXX-XX.XX-XX.XX

The first X gives the material detail, the next four the thickness in inches - X.XXX, then the width in inches - XX.XX, and finally the length in inches - XX.XX.

NOTE: Unless it is a 0.250 inch full plate, which is considered to be "sheet" stock, all plates will be sawn into more useable sizes and must have all three dimensions. Sawn plate with a full sheet length of 96 or 120 inches will be classified as "bar", see below.

NOTE: This allows all "-OP5" plate to become truly raw material instead of "a specific part number-OP5".

Aluminum Bar - 14X-X.XXX-X.XXX

The first X gives the material detail the next four the thickness in inches - X.XXX, then the width in inches - X.XXX. The "bar" may actually be sawn plate with the grain running the length of the bar and typically with a width of 3 inches or more.

Aluminum Rod, Round - 15X-X.XXX

The first X gives the material detail and the next four the diameter in inches - X.XXX.

Aluminum Rod, Hex - 16X-X.XXX

The first X gives the material detail and the next four the size in inches - X.XXX.

Aluminum Tube, Round - 17X-X.XXX-X.XXX

The first X gives the material detail, the next four the diameter in inches - X.XXX, and then the wall thickness in inches - X.XXX.

Aluminum Tube, Square or Rectangular - 18X-X.XXX-X.XXX-X.XXX

The first X gives the material detail, the next four the major nominal size in inches - X.XXX, then the minor nominal size - X.XXX, and then the wall thickness in inches - X.XXX.

Aluminum Skinned Honey Comb Panel - 1PX-X.XXX-X.XXX-X.XXX

The first X gives the material detail for the **aluminum skin**, the next four the overall thickness of the panel in inches - X.XXX, then the thickness of the panel skins in inches - X.XXX, the core material (A=5052, B=Nomex and C=Foam), and finally the wall thickness of the core in inches - .XXX.

NOTE: The material designation of the panel is the skin material; the core detail is given in the part description.

Aluminum Honey Comb Core - 1HX-X.XXX-X.XXX-X.XXX

The first X gives the material detail for the aluminum core, the next four the overall thickness of the core in inches - X.XXX, then the size of the core cells in inches - X.XXX, and finally the wall thickness of the core in inches - X.XXX.

Aluminum Laminated Shim Stock - 1LX-X.XXX-X.XXX

The first X gives the material detail (A=1100-H19, B=5052H39), the next four the nominal total thickness in inches - X.XXX, and then the individual sheet thickness in inches - X.XXX.

Aluminum Angles, Channels or Other Extrusions

The basic method would be to identify all extrusions with some intelligence as to material, shape and size - all with 15 digits. A typical identification would be:

- 1A (a shape code) X-X.XXX-X.XXX-X.XXX

The shape code and dimensions are the sticking points. Some of the more obvious ones include:

- A - Angles (both equal and unequal legs). The dimensions give the long leg, short leg, and thickness of the legs if they are the same. Angles with unequal thickness would omit the thickness to flag that they are not simply defined but would be detailed in the routing or Bill of Operations which defines the reference drawing, specification or a word description of the part to be purchased.
- T - Tee shaped extrusion. The dimensions would give the height, the width across the top of the TEE and then the thickness of the legs if all are the same. Unequal thicknesses would be handled as discussed above.
- C - Channels or C shaped extrusion. The dimensions would give the height of the C, the width and then the thickness of the legs if all are the same. Unequal thicknesses would be handled as discussed above.

Items such as floor tracks which look like a Tee with a base, track gripper channels which look like inverted U's with extensions to reach under the Tee shaped rail or standard passenger seat tracks with a slot and key hole cut outs are common shapes that are not as easily handled. A solution is:

- 1TR (a 2 letter shape code) X-X.XXX-X.XXX-.XXX

The shape code and dimensions are again the sticking points. Some of the more possibilities include:

- TR - Tracks or Tee Rails. The dimensions give the overall height, the width of the top or track flange and then the thickness of the top flange (3 digits only as .XXX). This gives key but minimal information about the extrusion. The rest would be detailed in the routing or Bill of Operations which defines the reference drawing, specification or a word description of the part to be purchased.
- TG - Track Gripper shaped extrusion. The dimensions would give the overall height of the section and the width and then the thickness of the gripper legs. Other details would be handled as discussed above.
- TP - Tracks Passenger type shaped extrusion. The dimensions would give the height and the overall width. Other details would be handled as discussed above.

Materials without an easily defined shape are:

- 1EX - Drawing Number

The E includes all other extrusions, the X - material detail such as 2 for 2024T3511, etc., and then includes the drawing number that defines the shape such as S20001.

Collins Aerospace extrusion 100C20039-37075T6511 becomes 1E7S200393. This gives no clue as to its shape but does lead one to the appropriate drawing defining the shape.

5.3. **Specifics for Steel**

The first digit for all steel is 2. The second digit is the shape code:

- 1 - Sheet
- 3 - Sawn Plate Rectangles
- 4 - Bar
- 5 - Rod, round

- 6 - Rod, hex
- 7 - Tube, round
- 8 - Tube, square or rectangular
- 9 - Miscellaneous steels, such as A-1 tool steel
- 0 -
- A - Angles
- C - Channels
- L - Laminated Shim Stock
- W - Wire
- WS - Wire Sheathing

The third digit gives the material detail:

- 1 - 1010-1020 Mild steel, Commercial Cold Rolled
- 2 - 1010-1020 Mild steel, Commercial Hot Rolled
- 3 - 1095 Spring steel
- 4 - 4130 Normalized - Condition N
- 5 - 4130 Condition F (Quenched and Tempered - 125ksi)
- 6 - 4140
- 7 - E4340
- 8 - E52100, UNS G15216
- 9 - 4130 Annealed - Condition A
- 0 -
- S - Special Shapes

A primary goal is to focus on 4130N as the steel of choice for all new Collins Aerospace design. 4130N provides good strength and ductility for crashworthiness. 4130F will be used if a slightly higher strength material is required. 1010-1020 commercial steel is not to be used on aircraft programs. 1010-1020 commercial steel may be used on build to print products if specified. E52100 and A-1 Tool Steel will be used only on non-structural where through hardening for wear is needed.

Steel Sheet - 21X-X.XXX (Ignore/delete all "-" or ".")

The first X gives the material detail, the last four the thickness in inches - X.XXX

Steel Plate - 23X-X.XXX-XX.XX-XX.XX

The first X gives the material detail, the next four the thickness in inches - X.XXX, then the width in inches - XX.XX, and finally the length in inches - XX.XX.

NOTE: Plate must have all three dimensions, even sawn plate with a length of 48, 96 or 120 inches.

NOTE: This should allow all "-OP5" plate to become truly raw material instead of "a specific part number-OP5".

Steel Bar - 24X-X.XXX-X.XXX

The first X gives the material detail the next four the thickness in inches - X.XXX, then the width in inches - X.XXX.

Steel Rod, Round - 25X-X.XXX

The first X gives the material detail and the next four the diameter in inches - X.XXX.

Steel Rod, Hex - 26X-X.XXX

The first X gives the material detail and the next four the size in inches - X.XXX.

Steel Tube, Round - 27X-X.XXX-X.XXX

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The first X gives the material detail, the next four the diameter in inches - X.XXX, and then the wall thickness in inches - X.XXX.

Steel Tube, Square or Rectangular - 28X-X.XXX-X.XXX-X.XXX

The first X gives the material detail, the next four the major nominal size in inches - X.XXX, then the minor nominal size - X.XXX, and then the wall thickness in inches - X.XXX.

Steel Angles, Channels or Other Shapes - 2A (or C or T) X-X.XXX-X.XXX-X.XXX

The only shapes involved appear to be angles, channels and tees. See discussion for aluminum.

5.4. Specifics for Stainless Steel

The first digit is 3 for stainless steel. The second digit is the shape code:

- 1 - Sheet
- 3 - Sawn Plate Rectangles
- 4 - Bar
- 5 - Rod, round
- 6 - Rod, hex
- 7 - Tube, round
- 8 - Tube, square or rectangular
- 9 -
- 0 -
- A - Angles
- C - Channels
- L - Laminated Shim Stock
- W - Wire
- WC - Wire Cable

The third digit gives the material detail:

- 1 - 304 Annealed, UNS S30400
- 2 - 17-4 Condition A - Annealed
- 3 - 17-4 Condition H 1150
- 4 - 17-7 Condition A - Annealed
- 5 - 301 ¼ Hard
- 6 - 301 ½ Hard
- 7 - 301 Full Hard
- 8 - 321 Condition A – Annealed
- 9 – 303SE CRES
- A - 15-5PH Condition H1150*
- B - PH13-8Mo Condition A – Annealed*
- C - PH13-8Mo Condition H1150
- D - 15-7 Condition A – Annealed
- E - 15-5 PH Condition A – Annealed
- F - 17 7C
- G - CUSTOM 455 AMS 5617
- H - 17-4 COND H1100
- J - 17-7 TH1050

K - PH13-8MO Condition H1050

L - 12-9-2 Maraging CRES Bar, Grade 1, per SAE AMS 5617

M - 302 Condition A – Annealed

*17-4, 15-5, and PH13-8Mo Condition A should not be used in the annealed condition. They should be heat treated.

**17-7 Condition A can be used in the annealed condition, but its mechanical properties should be evaluated before being chosen.

A primary goal is to focus on 15-5 as the stainless steel of choice for new designs. 15-7 will be used as the sheet metal of choice and should be considered as a substitute for 4130 in the effort to reduce the usage of Cadmium plating on 4130. 304 will be used as the tube preference. 17-7 should be used as the material of choice for spring parts, 301 can also be used for spring parts.

Follow same guidelines as for steel and aluminum.

5.5. **Specifics for Brass/Bronze/Copper**

The first digit is 4 for brass, bronze or copper. The second digit is the shape code:

- 1 - Sheet
- 3 - Sawn Plate Rectangles
- 4 - Bar
- 5 - Rod, round
- 6 - Rod, hex
- 7 - Tube, round
- 8 - Tube, square or rectangular
- 9 -
- A - Angles
- C - Channels
- L - Laminated Shim Stock
- W – Wire

The third digit gives the material detail:

- 1 - Brass, 464 Naval Brass, ½ Hard, UNS-C46400
- 2 - Phosphor Bronze, Composition A, UNS-C51000
- 3 - Aluminium Bronze, UNS-C61400
- 4 - Aluminium Bronze, UNS-C63000
- 5 - Cast Bronze, SAE 660, UNS-C93200
- 6 - Sintered Bronze, MIL-B-5687, Type I
- 7 - Sintered Bronze, MIL-B-5687, Type II
- 8 - Soft Copper Wire, AMS 4701 (CDA 110)
- 9 - 15-5PH Condition A – Annealed*
- A - 15-5PH Condition H1150*
- B - PH13-8Mo Condition A – Annealed*
- C - PH13-8Mo Condition H1150
- D – 15-7 Condition A - Annealed

A goal is to reduce the varieties of brass and bronze stocked. A material of choice is not clear at

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this time.

Follow same guidelines as for steel and aluminum.

5.6. Specifics for Plastics

The first digit is 5 for plastic. The second digit is the shape code:

- 1 - Sheet
- 2 - Tape
- 3 - Sawn Plate Rectangles
- 4 - Bar, Strip
- 5 - Rod, round
- 6 -
- 7 - Tube, round
- 8 - Webbing
- 9 - Cord
- 0 -
- H - Honeycomb Core
- L - Shim Stock
- PL - Panlam
- TP - Thermoplastic (Lexan, ABS, Boltaron, Kydex, Royalite)
- ET - Edge Trim

The third digit gives the material detail:

- 1 - Acetal (Delrin or Acetron GP*) - Black
- 2 - Acetal (Delrin) or Polyamide (Nylon) - Natural
- 3 - Delrin AF
- 4 - Nylatron
- 5 - UHMW (Ultra High Molecular Weight Polyethylene)
- 6 - Fluoroplastic (Teflon, TFE, PTFE)
- 7 - Polyester
- 8 - Vinyl (PVC)
- 9 - Fiberglass
- A- Flame Resistant ABS (Polylac PA-765)**
- B-
- C- Cicolac FR15-BK4051**
- D- Dow Corning GT-1600-T.150**
- L- Lexan (Lexan 121 NOT approved for new design)
- Z- Zytel 70G33 L
- P- Boltaron
- BO - Boltaron HS - Heat Shrink
- N - Nomex
- PB - Particle Board
- PW - Plywood
- R - Raybestos
- T - Torlon
- U - Polyurethane

*Acetron GP can be considered as a substitute for Delrin where an Acetal is required but the mechanical properties should be evaluated before use.

**For Injected Molded Plastics, High Temperature Flame Resistant Plastics (PPS material) are recommended as Low Temp Plastics can lose their Flame Resistant properties through processing. Refer to Collins Aerospace Spec GMS-013.

The next group of four digits will give the blend detail (which comes from the manufacturer):

- 4205 – Blend (high temp)
- 6530 – Blend
- NNNN – Not Specified

The next set of two digits will give the texture detail (which comes from the manufacturer):

- CM – Coarse Matte
- FT – Felt
- HC – Haircell
- LT – Levant
- MS – Mesa
- SD – Suede
- NN – Not Specified

The next three characters should give the color detail:

- BLK – Black
- BLG – Blue-Gray
- GRY – Gray
- CRM – Cream
- WHT – White
- NRL – Natural
- YLW – Yellow
- RED – Red
- BLU – Blue
- GRN – Green

The next four digits will give the thickness detail:

Example:

Example:	5TP	4205	FT	ABC	0093	F
Meaning:		Blend	Texture	Color	Thickness	Sheet Size
Final Outcome	5TP4205FTABC0093F					

The last letter will give sheer size. Sheer size is the length and width of the raw sheet material, and is important to maintain compatibility with the machines used to fabricate the part:

- A – Special order (typically 37.5 inches by 37.5 inches for plastic)
- F – Full sheet (48 inches by 48 inches)
- N – Not applicable

Numbers that follow use the same scheme as used for earlier materials giving diameter, thickness, etc. and possibly durometer, such as “D90.”

Note: Part numbers generated before September 1, 2021 can use the naming conventions defined in Revision W of this document.

5.7. Specifics for Foam and Rubber.

The first digit is 6 for foams and rubber. The second digit is the shape code:

- 1 - Sheet, Open Cell
- 2 - Sheet, Closed Cell
- 3 -
- 4 - Strip
- 5 -
- 6 - Tape
- 7 - Tube
- 8 - Elastic Cord
- 9 - Cord
- 0 -
- E - Extrusion

The third digit gives the material detail but depends on the second digit:

If the first part of the code is 61 or 64 and higher then:

- 1 - HR 70 Foam, 70 ILD
- 2 - HR 21 Foam, 21 ILD
- 3 - SAFLITE, 25 ILD
- 4 - SAFLITE, 40 ILD
- 5 - SAFLITE, 150 ILD
- 6 - Metzprotect MP65
- 7 - Metzprotect
- 8 - Foam, Other
- 9 - Rubber (at the end of the material code, specify the required durometer i.e. "D60" for a durometer of 60)
- A - DAX55
- B - DAX26
- C - DAX47
- D - DAX 90
- E - HR 2855 Foam ILD 55
- F - HR 32 Foam ILD 32
- S - Silicone
- SFF - Safeguard, Firm
- SFM - Safeguard, Medium

If the first part of the code is 62 then:

- 1 - Ensolite ALC
- 2 - Ensolite MC
- 3 - Ethafoam
- 4 - Divinycel HT50 (Obsolete)
- 5 - Divinycel HT70 (Obsolete)
- 6 - Rigid Urethane FR3704, 4 lb/cf
- 7 - Rigid Urethane FR3720, 20 lb/cf
- 8 - Minicel
- 9 - Rubber

A – Divynycel HT61

B – Ensolite AHC

Note: Material such as cushion foam that is only used on purchased parts does not need a 15 digit code.

5.8. *Specifics for Adhesives, Electrical Wire and Supplies*

The first digit is 7 for adhesives, electrical wire and other supplies. The second digit or letter(s) would indicate the type of material:

1 - Adhesives, Liquid

2 - Adhesives, Tape

3 - Adhesives, Sheet

EW - Electrical Wire

F - Filler

The third block of characters would be a code for the specific product (the manufacturer's number in most cases).

5.9. *Specifics for Finishes*

The first digit for all finishes is 8. The second digit would indicate the type of material:

1 – Paint, Water Borne, Acrylic, Cardinal Industrial Finishes 3600 series

2 - Powder Coat – Polyester TGIC Cardinal Industrial Finishes T231, T792 T006 & T241

(Note: T231 and T792 are for custom colors and T006 and T241 are off the shelf colors)

3 - Primer

4 – Paint, Polyurethane, Cardinal Industrial Finishes 6400/ 340HP series to be used with Cardinal Industrial Finishes 6760-73412 polyurethane acrylic 2K primer

5 - Powder Coat –Polyurethane - P009 (Off The Shelf)

The third block of three characters would be a code for the specific finish per Goodrich spec 6030.

5.10. *Specifics for Upholstery Materials*

The first digit for all fabrics is 9. The second digit would indicate the type of material. The third digit is shape (and is optional):

1 - Fabric

2 - Cotton Duck/Muslin

3 - Leather

4 - Sheepskin

5 - Synthetic – Naugahyde

6 – Fire block

7 - Nylon

8 - Carpet

9 – Leather, Retreated (non-Lantal), See spec 6030 for retreat process details.

S = Roll

(Ø)C = Cord

E - Elastic

R - Ribbon

W - Welting

The fourth block would generally be the assigned color code. This can be from one to four characters. This alpha/numeric code can be assigned by the customer or Collins Aerospace.

The last block is the three alpha letter ownership codes.

EXAMPLE: (Of a Collins Aerospace assigned color): Lufthansa's leather will be:
93RABKDLH

9 = First digit for all fabrics.

3 = Leather

ABK = Collins Aerospace assigned color code. (Could be a Boeing code like GK or Douglas code like ED22.)

DLH = Leather furnished by Lufthansa. (Could be BOE, Collins Aerospace, etc. as appropriate)

Note: Collins Aerospace code is AMI

Another Example is: 97125CBKAMI

Where 9 = First digit for all fabrics

7 = Nylon

125C - 125Ø Cord

BK = Color Code for Black

AMI = Furnished by Collins Aerospace

6.0 Procedure for Determining Kit Part

6.1. First three digits identify basic commodity.

WLD – Weld

UPH – Upholstery

PLS – Plastic

HDW – Hardware

MCH – Machine

SHT – Sheet Metal

MXD – Mixed (mixed commodity)

6.2. Next three digits identify a kit. Example: KIT

6.3. Seventh digit is a sequence number to indicate the Kit number (0-999).

6.4. Next 4 to 10 digits identify the where used part number (to include (-1 right/-2 left where needed)).

6.5. Next 1 – 6 digits identify color code.

Example:	Example:	WLD	KIT	005	3B2011-1	ABC
Meaning:	Basic Commodity	Kit Code	Sequence # (0-999)	Part # (Include dashes)	Color	
Final Outcome	WLDKIT0053B2011-1ABC					

7.0 Synthetic

Part

Numbers (700 Series includes the existing number):

7.1. Parts that require additional manufacturing or assembly to meet Engineering Spec. Adding a 7XX makes the last dash number.

Example: 1405-704XS11XX (would report to 1405-4)(XS11XX)

7.2. For in-house production; adding a 7XX makes the last dash number.

Example: 4C2001-701 (would report to 4C2001-1)

8.0 GOV Part Numbers

8.1. Commercial parts converted to military/government (GOV) parts by the addition of a military inspection step (i.e. Work Center 2435MLQC). This allows previously commercial parts to be sold to military/government entities requiring military inspection.

Example: 1C2114-1-GOV (would report to 1C2114-1)

9.0 UPH Parts

9.1. Vendor supplied upholstery kits.

Example: UPHKIT-10301DD.

10.0 MRO Kits

10.1. Seat kits (sub-assemblies) built in-house and certified in the MRO (Maintenance, Repair, and Overhaul) area.

Example: MRO2112-1R (would report to 2112).

- 11.1. Purchased parts requiring additional finishing (machining, plating, etc.) in manufacturing. Adding a “-OP5” makes the last dash number.
Example: 4657830-OP5 Retainer-Plate (would report to 4657830).

12.0 Review Procedure

On an annual basis, this engineering procedure will be reviewed for specification obsolescence by the COS Engineering Department. Findings, actions, and review participants will be documented in meeting minutes. Cases of obsolescence will be corrected via Collins Aerospace Document Change Request/Notice (DCRN) to revise the procedures within 30 days of review.

13.0 Records

Records are maintained in accordance with 1.16.1 Control of Records.

14.0 Global Trade (GT) Requirements

- 14.1. Collins Aerospace may not engage in activities or transactions involving parties, countries and end-users that are prohibited under applicable export and sanctions laws in accordance with GT-PRO-3400.
- 14.2. Prior to the export or re-export of an item, confirm the export classification for an item or service in xClass or other approved system. In addition to export classification, confirm the Harmonized Tariff or HTS for any tangible item prior to export or re-export in accordance with GT-PRO-4200.
- 14.3. Collins Aerospace must ensure that proper export authorization exists for all exports and re-exports based on the export classification, destination, end-use, and end-users of the item(s) or service(s) in accordance with GT-PRO-4100.
- 14.4. Various markings and statements are required to communicate legal, regulatory, and company policy requirements. Ensure that all items are appropriately marked in accordance with GT-PRO-4100.
- 14.5. Collins Aerospace must safeguard all export-controlled items from physical access by any foreign national persons (including employees, contractors, or visitors) unless export authorization exists for those individuals to access the items in accordance with GT-PRO-3200