



AEROSPACE INFORMATION REPORT

AIR4066™**REV. C**Issued 1987-06
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Superseding AIR4066B

(R) Aerospace Fluid Power – Materials and Characteristics of Flight Control
Servoactuators of Various Aircraft

RATIONALE

Revision C of this document has been produced to include aircraft that have entered production since the previous document revision.

1. SCOPE

This SAE Aerospace Information Report (AIR) defines the materials, strength and finishes utilized in current linear hydraulic flight control actuators. To keep the information at a relevant minimum, only cylinders (barrels), glands and pistons are listed. Also identified are the reasons for the material selection and any pertinent comments. All data were collected from the respective suppliers.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS-QQ-A-225/9 Aluminum Alloy 7075, Bar, Rod, Wire, and Special Shapes; Rolled, Drawn, or Cold Finished

AMS4640 Aluminum Bronze, Bars, Rods, Shapes, Tubes, and Forgings, 81.5Cu - 10.0Al - 4.8Ni - 3.0Fe, Drawn and Stress Relieved (HR50) or Temper Annealed (TQ50)

AMS5629 Steel, Corrosion-Resistant, Bars, Wire, Forgings, Rings, and Extrusions, 13cr - 8.0ni - 2.2mo - 1.1al, Vacuum Induction Plus Consumable Electrode Melted, Solution Heat Treated, Precipitation Hardenable

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Documents
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2.1.2 US Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

MIL-DTL-5541 Chemical Conversion Coatings on Aluminum and Aluminum Alloys

MIL-STD-1501 Chromium Plating, Low Embrittlement, Electrodeposition

2.2 List of Abbreviations

Al or Alum Bronze	Aluminum Bronze
Al MMC	Aluminum Metal Matrix Composite
Al-Ni-Br or Al-Ni-Bronze	Aluminum Nickel Bronze
Be-Cu or CuBe2	Beryllium Copper
CRES	Corrosion Resistant Steel
D-Gun	Detonation Gun (spraying)
EBHA	Electric Backup Hydraulic Actuator
EHA	Electrohydrostatic Actuator
ESR	Electroslag Remelting
Fwd	Forward
HT	Heat Treat
HVOF	High Velocity Oxygen Fuel (spraying)
IB or Inbd	Inboard
ID	Inside Diameter
ILCA	Integrated Lower Control Actuator
Ksi or ksi	1,000 pounds per square inch
LEX	Leading-edge Extension
MFS	Multi-function Spoiler
MTBF	Mean Time Between Failure
OB or Outbd	Outboard
OD	Outside Diameter
Ra	Roughness Average
RC	Rockwell C (hardness) Scale
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals



SCAS	Stability and Command Augmentation System
SRB	Solid Rocket Booster
SS	Stainless Steel
TFE	Tetrafluoroethylene
TVC	Thrust Vector Control

2.3 List of Aircraft Manufacturers

The following paragraphs list the most current or iconic name of the manufacturers of the aircraft described by type/model number in the “Aircraft” columns of Tables 2 through 7.

2.3.1 Commercial Transports

Comac: ARJ21

Airbus: A318, A319, A320, A321, A330, A340, A380

Boeing: B707, B717, B727, B737, B737NG, B747, B747-400, B747-8, B757, B767, B777, B787

Bombardier: BD-100, CRJ200, CRJ700, CRJ1000, CSeries, Global Express

Cessna: CJ4

DeHavilland Canada: DHC-7, DHC-8

Embraer: Legacy 450, 500, Phenom 300, EMB 170/190

Gulfstream: GII, GIII, G650

Hawker Beechcraft: Horizon

Lockheed: L-1011

McDonnell Douglas: DC-10, MD-11, MD90

SAAB: Saab 2000

Sukhoi: Superjet 100

2.3.2 Military Transports

Airbus Defence and Space: A400M

Lockheed Martin: C-130, C-141, C-5A, C-5B, S-3A

Boeing: E-3A, KC-135R

McDonnell Douglas: C-17, KC-10

Northrop Grumman: E-2C

2.3.3 Fighters/Bombers

McDonnell Douglas: AV-8B, F/A-18A-D, F/A-18 E/F/G, F-4

Rockwell: B-1B

Northrop Grumman: B-2, F-5

Convair: B-58B

General Dynamics: F-111

Lockheed Martin: F-117, F-16, F-22, F-35A/B/C,

AIDC (Taiwan): IDF

SAAB: JAS-39

Eurofighter: Typhoon

2.3.4 Helicopters

Bell: 206, 206B, 206L, 214ST, 222, 230, 407, 427, 429, UH-1Y, AH-1Z

Boeing: CH-47

McDonnell Douglas: AH-64

Agusta Westland: AW-609

Sikorsky: CH-53, S-76, S-92, UH-60

Airbus Helicopters: EC135, EC145

NH Industries: NH90

MD Helicopters: OH-6

Boeing/Sikorsky: RAH-66

Bell/Boeing: V-22

2.3.5 Missiles

Boeing: Delta IV, Minuteman, Peacekeeper

Lockheed Martin: Pershing II, Titan, Trident

2.3.6 Spacecraft

General Dynamics: Agena

Boeing: Saturn, Space Shuttle (Orbiter)

United Space Alliance: Space Shuttle (SRB)

3. PRESENTATION

The information is presented in tabular form and segregated as shown in Table 1 in the following categories:

Table 1

Table	Category	Pages
2	Commercial Transports	6 - 16
3	Military Transports	17 - 19
4	Fighters/Bombers	20 - 25
5	Helicopters	26 - 31
6	Missiles	32 - 34
7	Spacecraft	35

Each consists of unique tables for the cylinder, piston, and gland. The tables for each category are arranged alike: first, by alphanumerical order of the aircraft and then the suppliers. Note that the supplier names are representative of the nomenclature at the time data was first submitted or subsequently updated for inclusion herein. Unless otherwise noted in the tables, the surface actuators, including their components and their materials, can be assumed to be used on all versions of a particular aircraft type.

4. USAGE

The reader is advised to utilize the information contained herein with discretion. Since the information was supplied by the manufacturer, it is possible that a “no wear” or “no failure” statement may reflect a broad viewpoint. The manufacturer may have ignored occasional and/or sporadic problems, such as hydrogen embrittlement, corrosion, etc. which arose due to isolated circumstances. Certainly, problems typically encountered during qualification testing, and subsequently corrected, are not reflected in the tables either.

In summary, the information provided in this document is for historical purposes only. No endorsement of any specific material is to be construed.

Table 2

Table 2A - Category - commercial transport - cylinder

Supplier	Aircraft	Surface	Component - Cylinder Material	Component - Cylinder Finish	Component - Cylinder Reason	Component - Cylinder Comments
Parker Aerospace	ARJ 21	Aileron, Elevator, Rudder	15-5PH CRES, H1025	Bare	Not known	
Liebherr Aerospace	A318/319/320/321	Rudder	15-5PH CRES, H1025	Bore: Chrome Plate	Not known	
Liebherr Aerospace	A330/340	Spoilers	15-5PH CRES, H1000	Hard chrome	Wear	
Liebherr Aerospace	A330/340	Spoiler	15-5PH H1025	Bare	Not known	
Moog	A330/340	Inboard / Outboard Aileron	15-5PH CRES, 150-170 ksi	Hard chrome	Wear, fatigue	
Parker Aerospace	A330/340	Rudder	15-5PH CRES, H1025	Bare	Not known	
Liebherr Aerospace	A380	Spoiler	15-5PH CRES, H1025	Hard Chrome	High pressure, wear	
Parker - Bertea	B707	Rudder	High transverse 4340 Steel, 180 ksi	Flash chrome	Fit envelope, strength	
Parker Aerospace	B717	Spoiler	15-5PH CRES, H1025	Bare	Not known	
Parker - Bertea	B727	Aileron	2014-T6 with 420 SS sleeve	Bare	Weight, wear	Excellent Life
Parker - Bertea	B727	Elevator	7075-T73 with 4340 Steel, 160 ksi liner	Bare	Weight, cost, wear	
Parker - Bertea	B727	Elevator - Original	7075-T73	Bare	Weight, cost	Wear area near neutral, no actual problems
Parker - Bertea	B727	Flight Spoiler	4340 Steel, 125 ksi	Bare	Customer design	
Parker - Bertea	B727	Rudder	7075-T73	Hard anodize	Weight, cost	
Parker - Bertea	B727	Rudder - Original	7075-T73	Bare	Weight, cost	Wear area near neutral, no actual problems
Smiths Aerospace	B737	Flight Spoiler	17-4PH CRES, 180-200 ksi	Bare	Customer design	
Parker - Bertea	B737	Aileron	7075-T73	Hard anodize	Cost, weight, part of body	
Parker - Bertea	B737	Elevator	7075-T73	Hard anodize	Cost, weight, part of body	
Parker - Bertea	B737	Rudder	7075-T73	Hard anodize	Cost, weight, part of body	
Parker Aerospace	B737NG	Rudder	4340 Steel, HT 150-170 ksi		Not known	
HR Textron	B747	Lateral Control	7075-T73	Hard anodize	Weight, cost, wear	No reported failures or wear-out
Moog	B747	Ground Spoiler	7075 T73	Hard anodize	Wear, weight, cost	No reported failure or wear-out
Moog	B747	Inboard Aileron	17-4PH CRES, 165 ksi min.	Electrolize	Wear, Corrosion resistance	No reported failure or wear-out
Moog	B747	Inboard Spoiler	15-5PH CRES, 180-200 ksi	Bare	Wear, Corrosion resistance	No reported failure or wear-out
Moog	B747	Lateral Central Control	15-5PH CRES, H1025	Bare	Weight, wear	
Moog	B747	Outboard Aileron	17-4PH CRES, 165 ksi min	Electrolize	Wear, Corrosion resistance	No reported failure or wear-out
Moog	B747	Outboard Spoiler	15-5PH CRES, 180-200 ksi	Bare	Wear, Corrosion resistance	No reported failure or wear-out
Moog	B747	Special Inboard Spoiler	15-5PH CRES, 180-200 ksi	Bare	Wear, Corrosion resistance	No reported failure or wear-out
Parker - Bertea	B747	Elevator - Original	4340 Steel, 180 ksi	Flash chrome	Strength, size	



Supplier	Aircraft	Surface	Component - Cylinder Material	Component - Cylinder Finish	Component - Cylinder Reason	Component - Cylinder Comments
Parker - Bertea	B747	Inboard Elevator	4340 Steel, 180 ksi	Flash chrome	Strength, size	
Parker - Bertea	B747	Outboard Elevator	4340 Steel, 180 ksi	Flash chrome	Strength, size	
Parker - Bertea	B747	Rudder	2014-T6	Hard anodize	Fatigue, weight	No reported failures or wear-out
Parker - Bertea	B747-400	Inboard Elevator	4340 Steel, 180 ksi	Flash chrome	Strength, wear	
Parker - Bertea	B747-400	Lower Rudder	15-5PH CRES, 180-200 ksi	Hard chrome	Good fatigue, wear	
Parker - Bertea	B747-400	Outboard Elevator	4340 Steel, 180 ksi	Bare	Strength, wear	
Parker - Bertea	B747-400	Upper Rudder	15-5PH CRES, 180-200 ksi	Hard chrome	Good fatigue, wear	
Nabtesco	B747-8	IB/OB Aileron, IB/OB Spoiler	15-5PH CRES, 155-175 ksi	Bare	Wear, corrosion resistance, compact envelope	Excellent performance history
Nabtesco	B747-8	Lower and Upper Rudder	15-5PH CRES, H1025	Bare	Not known	
Moog	B757	Elevator	15-5PH CRES, 150-170 ksi	Hard chrome	Wear, corrosion, customer preference, fatigue strength	No reported failure or wear-out
Moog	B757	Flight Spoiler	15-5PH CRES, 150-170 ksi	Hard chrome	Wear, corrosion, customer preference, fatigue strength	No reported failure or wear-out
Moog	B757	Inboard Spoiler	15-5PH CRES, 150-170 ksi	Hard chrome	Wear, corrosion, customer preference, fatigue strength	No reported failure or wear-out
Moog	B757	Rudder	15-5PH CRES, 150-170 ksi	Hard chrome	Wear, corrosion, customer preference, fatigue strength	No reported failure or wear-out
Parker - Bertea	B767	Elevator	15-5PH CRES, H1025	Bare	Customer selected, wear, strength	
Parker - Bertea	B767	Inboard Aileron	15-5PH CRES, H1025	Bare	Customer selected, wear, strength	
Parker - Bertea	B767	Outboard Aileron	15-5PH CRES, H1025	Bare	Customer selected, wear, strength	
Parker - Bertea	B767	Rudder	15-5PH CRES, H1025	Bare	Customer selected, wear, strength	
Nabtesco	B767	IB/OB Spoiler	15-5PH CRES, 155-175 ksi	Bare, 125 Ra	Wear, corrosion resistance, compact envelope	Excellent performance history
Moog	B777	Spoiler	15-5PH CRES, H1025	Bare	Weight, wear	
Parker - Bertea	B777	Rudder	15-5PH CRES, H1025	Bare, 125 Ra	Wear, corrosion resistance	Excellent performance history
Nabtesco	B777	Aileron, Flaperon, Elevator	15-5PH CRES, H900 (Sleeve)	Bare, 32 Ra	Wear, corrosion resistance, compact envelope	Excellent performance history
Moog	B787	All Primary Controls and Inbd/Outbd Spoiler	15-5PH CRES, H1025	Bare	Wear	
Moog	BD-100	Rudder, Elevators, Spoilers	15-5PH CRES, H1025	Bare	Wear	
Parker Aerospace	CJ4	Modulated Speed Brake	15-5PH CRES, H1025	Bare	Not known	
Goodrich Toronto	CRJ 200	Aileron, Elevator, Rudder, Spoileron	15-5PH CRES, HT 150-175 ksi		Not known	

Supplier	Aircraft	Surface	Component - Cylinder Material	Component - Cylinder Finish	Component - Cylinder Reason	Component - Cylinder Comments
Goodrich Toronto	CRJ 700	Elevator, Rudder, Ground Spoiler, Multi Function Spoiler, Aileron	15-5PH CRES, HT 150-175 ksi		Not known	
Liebherr Aerospace	CRJ1000	Rudder	15-5PH CRES, H1025	Bare	Size, REACH	
Parker Aerospace	C Series	All Primaries and Multi-function Spoiler	15-5PH CRES, H1025	Bare	Not known	
Parker - Bertea	DC-10	All Primary Surfaces	4340 Steel, 180 ksi	Bare	Customer preference, strength	
Parker - Bertea	DC-10	Rudder	4340 Steel, 180 ksi	Bare	Customer preference, strength	
Parker - Bertea	DHC-7	Flight Spoiler	7075-T73 with 4340 Steel, 160 ksi liner	Anodize bare	Weight, cost, wear	
Parker - Bertea	DHC-7	Rudder	4340 Steel, 180 ksi	Bare	Strength, wear	
Smiths Aerospace	DHC-8	Flight Spoiler	4340 Steel,	Bare	Wear	
Parker Aerospace	EMB Legacy 450/500	All Primaries and Spoilers	15-5PH CRES, H1025	Bare	Not known	
Parker Aerospace	EMB Phenom 300	Multi-function Spoiler	15-5PH CRES, H1025	Bare	Not known	
Parker Aerospace	EMB 170/190	Aileron	4130 Steel, 150-170 ksi	Bare	Not known	
Parker Aerospace	EMB 170/190	Rudder, Elevator, MFS and Ground Spoiler	15-5PH CRES, H1025	Bare	Not known	
Parker - Bertea	GII	All Surfaces	7075-T73	Bare	Weight, cost	
Parker - Bertea	GII	Rudder	7075-T73	Bare	Weight, cost	
Parker - Bertea	GIII	Ground Spoiler	7075-T73	Bare	Weight, cost	
Parker Aerospace	G650	All Primaries and Spoilers	15-5PH CRES, H1025	Bare	Not known	
Parker Aerospace	Global Express	All	15-5PH CRES, H1025	Bare	Not known	
Moog	L-1011	Spoiler	4340 Steel, 180-200 ksi	Bare	Wear, high snubbing pressure	No reported wear. Corrosion of moisture retaining surfaces
Parker - Bertea	L-1011	Horizontal Stabilizer	4340 Steel, 180 ksi	Flash chrome	Strength, size	
Parker - Bertea	L-1011	Inboard Aileron	2014-T6	Hard anodize	Fatigue, weight	No reported failures or wear-out
Parker - Bertea	L-1011	Outboard Aileron	2014-T6	Hard anodize	Fatigue, weight	No reported failures or wear-out
Parker - Bertea	L-1011	Rudder	2014-T6	Hard anodize	Fatigue, weight	No reported failures or wear-out
Smiths Aerospace	MD 90	Elevator	15-5PH CRES, 180-200 ksi	Bare	Wear, corrosion resistance strength	
Nabtesco	MD-11	IB/OB Elevator	4340 Vacuum Melt Steel, 200 ksi	Bare, 125 Ra	Wear, Structural strength	Poor corrosion resistance
Parker - Bertea	MD-11	Outboard Aileron	4340 Steel, 180 ksi	Bare	Strength, wear	
Smiths Aerospace	SAAB 2000	Elevator	4340 Steel, 160-190 ksi	Bare	Wear, corrosion resistance strength	
Smiths Aerospace	SAAB 2000	Rudder	4340 Steel, 160-190 ksi	Bare	Wear, corrosion resistance strength	

Supplier	Aircraft	Surface	Component - Cylinder Material	Component - Cylinder Finish	Component - Cylinder Reason	Component - Cylinder Comments
Liebherr Aerospace	Superjet 100	Aileron Elevator Rudder Flight Spoiler	15-5PH CRES, H1025	Bare	Size, REACH	
Liebherr Aerospace	Superjet 100	Ground Spoiler	7075-T7351	Hard Anodize	Weight, No. of cycles	

Table 2B - Category - commercial transport - piston

Supplier	Aircraft	Surface	Component - Piston Material	Component - Piston Finish	Component - Piston Reason	Component - Piston Comments
Parker Aerospace	ARJ 21	Aileron, Elevator, Rudder	15-5PH CRES, H1025	Rod: Tungsten Carbide Head: Chrome Plate	Not known	
Liebherr Aerospace	A318/319/320/321	Rudder	35 NCD 16 Alloy Steel	Rod: Chrome Plate Head: none	Not known	Good performance
Liebherr Aerospace	A330/340	Spoiler	PH13-8Mo CRES, H1000	Hard chrome	Minimum weight, wear	
Liebherr Aerospace	A330/340	Spoiler	15-5PH	Rod: Chrome Plate Head: Rilsan Coated	Head protection due to unbalanced piston design	Good performance
Moog	A330/340	Inboard / Outboard Aileron	15-5PH CRES, 150-170 ksi	Hard chrome	Wear, fatigue	Good performance
Parker Aerospace	A330/340	Rudder	15-5PH CRES, H1025	Rod: Tungsten Carbide	Wear surface	
Liebherr Aerospace	A380	Spoiler	15-5PH CRES, H1025	Rod: Tungsten Carbide (D-Gun), Head Rilsan coated	Head protection due to unbalanced piston design, Tungsten Carbide due to REACH	
Parker Aerospace	B707	Rudder	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B717	Spoiler	15-5PH CRES, H1025	Rod and Head: Chrome Plate	Not known	
Parker Aerospace	B727	Aileron	410 SS, RC 39/44	Bare	Wear	Excellent
Parker Aerospace	B727	Elevator	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B727	Elevator - Original	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B727	Flight Spoiler	15-5PH CRES, 180 ksi	Hard chrome	Wear, strength, corrosion resistance	
Parker Aerospace	B727	Rudder - Original	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Smiths Aerospace	B737	Flight Spoiler	17-4PH CRES, 180-200 ksi	Hard chrome	Customer design	
Parker Aerospace	B737	Aileron	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B737	Elevator	17-4PH CRES, 180 ksi	Hard chrome	Corrosion resistance	
Parker Aerospace	B737	Rudder	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B737NG	Rudder	15-5PH CRES, H1025	Rod: Tungsten Carbide	Wear surface	
HR Textron	B747	Lateral Control	17-4PH CRES 180-200 ksi	Hard chrome	Wear corrosion resistance, strength	No reported failures or wear-out
Moog	B747	Ground Spoiler	4330M Steel, 220-240 ksi	Hard chrome	Wear, weight	No reported failures or wear-out
Moog	B747	Inboard Aileron	4330M Steel, 220-240 ksi	Hard chrome	Wear, weight	No reported failures or wear-out
Moog	B747	Inboard Spoiler	4340 Steel, 180-200 ksi	Hard chrome	Wear, weight	No reported failures or wear-out
Moog	B747	Lateral Central Control	15-5PH CRES, H1025	Hard chrome	Wear, weight	
Moog	B747	Outboard Aileron	15-5PH CRES, 180-200 ksi	Hard chrome	Wear, weight	No reported failures or wear-out
Moog	B747	Outboard Spoiler	15-5PH CRES, 180-200 ksi	Hard chrome	Wear, weight	No reported failures or wear-out
Moog	B747	Special Inboard Spoiler	4330M Steel, 220-240 ksi	Hard chrome	Wear, weight	No reported failures or wear-out

Supplier	Aircraft	Surface	Component - Piston Material	Component - Piston Finish	Component - Piston Reason	Component - Piston Comments
Parker Aerospace	B747	Elevator - Original	4340M Steel, 270 ksi (long) 4340 Steel, 180 ksi (short)	Hard chrome	Wear, Strength	Some corrosion problems were reported
Parker Aerospace	B747	Inboard Elevator	15-5PH CRES, 180 ksi	Hard chrome	Corrosion resistance, good fatigue	
Parker Aerospace	B747	Outboard Elevator	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B747	Rudder	17-4PH CRES 190 ksi	Hard chrome	Wear	Excellent
Parker Aerospace	B747-400	Inboard Elevator	15-5PH CRES, 180-200 ksi	Hard chrome	Corrosion resistance, good fatigue	
Parker Aerospace	B747-400	Lower Rudder	15-5PH CRES, 180-200 ksi	Hard chrome	Corrosion resistance, good fatigue	
Parker Aerospace	B747-400	Outboard Elevator	4340 Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B747-400	Upper Rudder	15-5PH CRES, 180-200 ksi	Hard chrome	Corrosion resistance, good fatigue	
Nabtesco	B747-8	IB/OB Aileron, IB/OB Spoiler	15-5PH CRES, 155-175 ksi	Hard chrome	Wear, corrosion resistance, strength	Excellent performance history
Nabtesco	B747-8	Lower and Upper Rudder	15-5PH CRES, H1025	Rod and Head: Tungsten Carbide	Not known	
Moog	B757	Elevator	15-5PH CRES, 150-180 ksi	Hard chrome	Wear corrosion resistance, customer preference	No reported failures or wear-out
Moog	B757	Flight Spoiler	15-5PH CRES, 150-180 ksi	Hard chrome	Wear corrosion resistance, customer preference	No reported failures or wear-out
Moog	B757	Inboard Spoiler	15-5PH CRES, 150-180 ksi	Hard chrome	Wear corrosion resistance, customer preference	No reported failures or wear-out
Moog	B757	Rudder	15-5PH CRES, 150-180 ksi	Hard chrome	Wear corrosion resistance, customer preference	No reported failures or wear-out
Parker Aerospace	B767	Elevator	4330M Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B767	Inboard Aileron	4330M Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B767	Outboard Aileron	4330M Steel, 180 ksi	Hard chrome	Wear, strength	
Parker Aerospace	B767	Rudder	4330M Steel, 180 ksi	Hard chrome	Wear, strength	
Nabtesco	B767	IB/OB Spoiler	15-5PH CRES, 180 – 200 ksi	Hard chrome	Wear, corrosion resistance, strength	Excellent performance history
Moog	B777	Spoiler	15-5PH CRES, H1025 or PH13-8MO	Hard chrome	Wear, fatigue Wear, strength	
Parker Aerospace	B777	Rudder	15-5PH CRES, H1025	Hard chrome	Wear, strength	
Nabtesco	B777	Aileron, Flaperon, Elevator	15-5PH CRES, H1025	Hard chrome	Wear, strength, corrosion resistance	Excellent performance history
Moog	B787	All Primary Controls and Inbd/Outbd Spoiler	15-5PH CRES, H1025	HVOF	Wear	
Moog	BD-100	Rudder, Elevators, Spoilers	15-5PH H1025	Hard chrome	Wear, corrosion resistance	
Parker Aerospace	CJ4	Modulated Speed Brake	15-5PH CRES, H1025	Rod: Tungsten Carbide Head: Chrome Plate	Not known	
Goodrich Toronto	CRJ 200	Aileron	13-8PH per AMS 5629	Chrome per MIL-STD-1501_CL 2 Type II	Not known	
Goodrich Toronto	CRJ 200	Elevator, Rudder, Spoileron	15-5PH per AMS 5659	Chrome per MIL-STD-1501_CL 2 Type II	Not known	

