

AEROSPACE INFORMATION REPORT

SAE AIR1408

REV.
A

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Superseding AIR1408

Aerospace Fuel System Specifications and Standards

1. SCOPE:

This report lists documents that aid and govern the design of gas turbine powered aircraft and missile fuel systems. The report lists the military and industry specifications and standards and the most notable design handbooks that are commonly used in fuel system design.

The specifications and standards section has been divided into two parts, a master list arranged numerically of all industry and military specifications and standards and a component list that provides a functional breakdown and a cross-reference of these documents. It is intended that this report be a supplement to specifications MIL-F-8615, MIL-F-17874, MIL-F-38363 and MIL-F-87154. Revisions and amendments which are correct for the specifications and standards are not listed.

The fuel system design handbooks are listed for fuels and for system and component design.

1.1 Availability of Documents:

The following information pertains to the availability of specifications and standards.

- 1.1.1 Military Documents: Department of Defense Index of Specifications and Standards; prepared by the Naval Publications and Forms Center (MPEC 103), Philadelphia, PA 19120. This document is published annually with bi-monthly cumulative supplements.
- 1.1.2 Society of Automotive Engineers, Inc.: SAE Aerospace Standards, Recommended Practices, Information Reports (AS, ARP, AIR) Index. This document is published by SAE, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.
- 1.1.3 American Society for Testing and Materials Documents: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.
- 1.1.4 Federal Aviation Administration Technical Standard Orders: Available from FAA; Aircraft Engineering Division (AWS-100); 800 Independence Avenue, SW, Washington, DC 20591.
- 1.1.5 Industry Documents: Available from appropriate company.

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2. MASTER LIST OF DOCUMENTS:

2.1 Air Force-Navy Aeronautical Standards:

ANA 107	Inspection Standards for Stand and Dissection Tested Self-Sealing Fuel and Oil Cells (Use MIL-STD-801)
ANA 112	Acceptance Standards for Self-Sealing Fuel and Oil Cells (Use MIL-STD-801)
AN2555	Nozzle - Aircraft Fueling

2.2 Federal Aviation Administration Technical Standard Orders (TSO):

AC 20-53	Protection of Aircraft Fuel Systems Against Lightning
TSO-C44	Fuel Flowmeters
TSO-C47	Pressure Instruments - Fuel, Oil, and Hydraulic
TSO-C53	Fuel and Engine Oil System Hose Assemblies
TSO-C76	Fuel Drain Valves
TSO-C77	Gas Turbine Auxiliary Power Units
TSO-C80	Flexible Fuel and Oil Cell Material

2.3 Federal Specifications and Standards:

BB-N-411	Nitrogen, Technical
P-D-680	Dry Cleaning Solvent
QQ-C-320	Chromium Plating
QQ-P-416	Plating, Cadmium (Electro deposited)
TT-S-735	Standard Test Fluids, Hydrocarbon
VV-F-800	Fuel Oil, Diesel
VV-F-815	Fuel Oil, Burner
VV-G-109	Gasoline, Unleaded
VV-G-1690	Gasoline, Automotive, Leaded or Unleaded

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2.3 (Continued):

WW-T-700E/Gen	Tube, Aluminum and Aluminum Alloy Drawn, Seamless, General Spec for
FED-STD-595	Colors, Requirements for Individual Chips Submitted

2.4 Industry Specifications:

ANSI/ASTM D 471	Rubber Properties, Effect of Liquids
ASTM D 1655	Aviation Turbine Fuels, Type A, A-1 and B; American Society of Testing and Materials
DDA/GM EMS64	Fuel, Turbine Engine Commercial Aircraft; Detroit Diesel Allison/General Motors Corporation
EMS 53111	Jet A Type Fuel Specification, Garrett Turbine Engines
EMS 53112	Jet A-1 & JP-8 Type Fuels Specification, Garrett Turbine Engines
EMS 53113	Jet B & JP Type Fuels Specification, Garrett Turbine Engines
EMS 53116	JP-5 Fuel Specification, Garrett Turbine Engines
G.E. D50TF2-54	Aviation Turbine Fuels; General Electric Company
PWA 522 (also Service Bulletin No. 2016)	Fuel, Commercial Aircraft Turbine Engine; Pratt and Whitney Aircraft Group/United Technologies

2.5 Military Specifications:

MIL-D-1000	Drawings, Engineering & Associated Lists (Also DOD-D-1000)
MIL-G-3056	Gasoline, Automotive, Combat
MIL-R-3065	Rubber, Fabricated Product
MIL-R-3390	Ring, DEE
MIL-S-4040	Solenoid, Electrical, General Specification for
"C" MIL-N-4180	Nozzles, Fuel and Oil Servicing (Use MIL-N-26978)
MIL-H-4495	Hose Assembly, Rubber, Aerial Refueling (Asg)

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2.5 (Continued):

MIL-E-5007	Engine, Aircraft, Turbojet and Turbofan, General Specifications for "C" - Document is now cancelled.
MIL-A-5070	Adaptor, Hose to Tube, Pipe and Flange, Reusable, Hydraulic, Fuel and Oil Lines
MIL-B-5087	Bonding, Electrical, and Lightning Protection, for Aerospace Systems
MIL-W-5088	Wiring, Aerospace Vehicle
"C" MIL-J-5161	Jet Fuel, Referee
MIL-P-5238	Pump, Centrifugal, Fuel Booster, Aircraft, General Specification for
MIL-P-5315	Packing, Preformed, Hydrocarbon Fuel Resistant
MIL-E-5400	Electronic Equipment, Aerospace, General Specification for
MIL-V-5529	Valve, Hydraulic Directional Control, Rotary Selector
MIL-V-5530	Valve, Aircraft Hydraulic Shuttle
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys
MIL-G-5572	Gasoline, Aviation, Grades 80/87 and 100/130, 115/145
MIL-F-5577	Fitting, Tank, Powerplant Fluid, Removable
MIL-T-5578	Tank, Fuel, Aircraft, Self-Sealing
MIL-T-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-G-5672	Gages, Fuel and Oil Quantity, Float Type, A/C, General Specification for
MIL-N-5877	Nozzle, Pressure Fuel Servicing, Locking, Type D-1, Nominal 2-1/2 Inch Diameter
"C" MIL-C-6021	Casting, Classification and Inspection of (Superseded by MIL-STD-2175)
MIL-E-6051	Electromagnetic Compatibility Requirements, Systems

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2.5 (Continued):

MIL-H-6088	Heat Treatment of Aluminum Alloys
MIL-I-6181	Interference Control Requirements, Aircraft Equipment
MIL-T-6396	Tank, Aircraft Propulsion Fluid System, Internal, Removable, Non-Self-Sealing
	"C" - Document is now cancelled.
"C" MIL-A-6444	Adaptor, Pressure Fuel Servicing, Type A-2 (Use MIL-A-25896)
"C" MIL-A-6445	Adaptor, Pressure Fuel Servicing, Type A-3 (Use MIL-A-25896)
"C" MIL-A-6446	Adaptor, Pressure Fuel Servicing, Type A-4 (Use MIL-A-25896)
MIL-L-6503	Lighting Equipment, Aircraft, General Specifications for Installation of
MIL-P-6525	Pump, Fuel Transfer, Aerial Refueling, General Specification for
MIL-L-006730	Lighting Equipment, Exterior, Aircraft, General Requirements for
MIL-S-6758	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
MIL-R-6800	Resin Coating, Permanent, for Aircraft Engine Parts, Application of
MIL-R-6855	Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shapes
MIL-P-6992	Pump Assembly, Fuel, Electrically Driven, Aircraft Heater
MIL-C-7024	Calibrating Fluid, Aircraft Fuel System Components
MIL-H-7061	Hose, Rubber, Aircraft, Self-Sealing, Aromatic Fuel
MIL-E-7080	Electric Equipment, Aircraft, Selection and Installation of
MIL-F-7179	Finishes, Coatings, and Sealants for the Protection of Aerospace Weapon System
MIL-F-7190	Forging, Steel, for Aircraft and Special Ordinance Applications
"C" MIL-C-7244	Cap and Adapter Unit, Tank Filler (Use MIL-C-38373)
MIL-T-7378	Tank, Fuel, Aircraft, External, Auxiliary, Removable

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2.5 (Continued):

MIL-C-7413	Coupling, Quick Disconnect, Automatic Shutoff, General Specification for
MIL-I-7566	Indicator System, Fuel Flowmeter, General Specification for "C" - Document is now cancelled.
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specifications for
MIL-V-7899	Valves, Check, Aircraft Fuel System
MIL-G-7940	Gages, Liquid Quantity, Capacitor Type, Installation and Calibration of
MIL-M-7969	Motors, Alternating Current, 400 Cycle, 115/200-Volt System, Aircraft, General Specification for
MIL-P-8045	Plastic, Self-Sealing and Non-Self-Sealing Tank Backing Material
MIL-I-8500	Interchangeability and Replaceability of Component Parts for Aerospace Vehicles
MIL-S-8516	Sealing Compound, Polysulfide Rubber, Electric Connectors and Electric Systems, Chemically Cured
MIL-E-8593	Engine, Aircraft, Turboshift and Turboprop, General Specification for
MIL-C-8603	Clamp, Loop Type, and Straps, Support
MIL-C-8605	Cap; Pressure Fuel Servicing
MIL-T-8606	Tubing, Steel, Corrosion-Resistant (18-8 Stabilized and Extra Low Carbon)
MIL-V-8608	Valves, Fuel Shutoff, Electric Motor Operated
MIL-M-8609	Motors, DC, 28 Volt System, Aircraft, General Specification for
MIL-V-8610	Valves, Fuel Shutoff Solenoid Operated, 28 Volts D.C.
MIL-F-8615	Fuel Systems Components, General Specification for
MIL-A-8625	Anodic Coating, for Aluminum and Aluminum Alloys

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2.5 (Continued):

MIL-P-8686	Power Units, Aircraft Auxiliary, Gas Turbine-Type, General Specifications for
MIL-D-8706	Data and Tests, Engineering, Contract Requirements for Aircraft Weapon Systems
MIL-D-8708	Demonstration Requirements for Airplanes
MIL-S-8710	Strainer, Aircraft Fuel System, General Specification for
MIL-H-8794	Hose, Rubber, Hydraulic, Fuel and Oil Resistant
MIL-H-8795	Hose Assembly, Rubber, Hydraulic, Fuel and Oil Resistant
MIL-S-8802	Sealing Compound, Temperature Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High-Adhesion
MIL-A-8865	Airplane Strength and Rigidity Miscellaneous Loads
MIL-S-8879	Screw Threads, Controlled Radius Root with Increased Minor Diameter, General Specification for
MIL-C-8956	Clamp, Loop, Tube Support
MIL-S-9395	Switches, Pressure (Absolute, Gage, and Differential), General Specification for
MIL-Q-9858	Quality Program Requirements
MIL-T-14442	Tank Fuel, Engines, Non-Metallic, Non-Self-Sealing, for Military Vehicles
MIL-F-17874	Fuel Systems, Aircraft, Installation and Test of
MIL-F-18802	Fuel and Oil Lines, Aircraft, Installation of
MIL-T-18847	Tank, Fuel, Aircraft, Auxiliary External, Design and Installation of
MIL-A-19736	Air Refueling Systems, General Specification of
MIL-A-21180	Aluminum-alloy Castings, High Strength
MIL-C-22263	Coupling, Fuel Line, Flexible, 125 psi, General Specification for

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2.5 (Continued):

MIL-A-22847	Air Refueling Store System: D-704
MIL-I-25017	Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble (Metric)
MIL-V-25023	Valve, Fuel Drain, Self-Locking
MIL-M-25047	Markings and Exterior Finish Colors for Airplanes, Airplane Parts, and Missiles (Ballistic Missiles Excluded)
MIL-N-25161	Nozzle, Aerial Pressure Refueling, Type MA-2
MIL-C-25162	Coupling, Reception, Flight Pressure Refueling, Type MA-2
MIL-E-25499	Electrical System, Aircraft, Design and Installation of, General Specification for
MIL-F-25524	Turbine Fuel, Aviation, Thermally Stable
MIL-H-25579	Hose Assembly, Tetrafluoroethylene, High Temperature, Medium Pressure, General Requirements for
MIL-J-25656	Jet Fuel, Grade JP-6
MIL-T-25783	Tank, Fuel A/C and Missile, Non-Self-Sealing High Temperature, Removable
MIL-A-25896	Adapter, Pressure Fuel Servicing, Nominal 2-1/2 inch Diameter
"C" MIL-R-25897	Rubber, Fluorocarbon Elastomer, High Temperature, Fluid Resistant (Use MIL-R-83248)
MIL-T-25905	Transmitter, Rate of Flow TRU-7/A, Fuel, 0-15,000 PPH
MIL-I-25906	Indicator, Rate of Flow EFU-3/A, Fuel, 0-15,000 PPH
MIL-S-25980	Switch, Float, Aircraft Fuel Level, General Specification for
MIL-R-25988	Rubber, Fluorosilicone Elastomer, Oil-and-Fuel-Resistant, Sheets, Strips, Molded Parts and Extruded Shapes
MIL-F-26364	Fitting, Tank, High Temperature, Non-Self-Seal Aircraft and Missile
"C" MIL-S-26390	Switch Assemblies, Pressure, Aircraft Fuel (None Given)

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2.5 (Continued):

"C" MIL-N-26978	Nozzle, Fuel & Oil Servicing, Over Wing, Shockproof, Type MD-1, MD-2 (Use MIL-N-87963)
MIL-G-26988	Gage, Liquid Quantity, Capacitor Type, Transistorized, General Specification for
MIL-F-27351	Fluid, Calibrating, High Flash Point, Aircraft Fuel System Components
MIL-T-27422	Tank, Fuel, Crash-Resistant, Aircraft
MIL-R-27521	Receptacle, Flying Boom, Aerial Refueling, General Specification for
MIL-C-27536	Coupling, Clamp, Grooved, V-Band "C" - Document is now cancelled.
MIL-I-27686	Inhibitor, Icing, Fuel System
MIL-T-38144	Transmitter, Rate of Flow, Fuel
MIL-T-38219	Turbine Fuel, Low Volatility, JP-7
MIL-A-38301	Application Requirements for MIL-C-38300 Connector, Electrical (Inactive)
MIL-F-38363	Fuel System, Aircraft, General Specification for
MIL-C-38373	Cap, Fluid Tank Filler
MIL-S-38449	Signal and Signal/Intercommunication Amplifiers, Universal, Aerial Refueling
MIL-A-38726	Adaptor Assembly, Reusable, Flexible Hose, Low Pressure
MIL-C-38999	Connector, Electrical, etc.
MIL-I-45208	Inspection System Requirements
MIL-C-45662	Calibration System Requirements (Now MIL-STD-45662)
MIL-T-46786	Tanks, Fuel, Engine: General Requirements for
MIL-R-52255	Repair Kits, Emergency, Collapsible Tanks, and Drums, Petroleum

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2.5 (Continued):

MIL-N-52747	Nozzle Assembly, Closed Circuit Refueling
MIL-N-52748	Nozzle, Adaptor, Closed Circuit to Gravity Fill
MIL-T-52983	Tank, Fabric, Collapsible, 3,000, 10,000, 20,000, and 50,000 Gallon, Petroleum
MIL-D-81298	Dye, Liquid, for Detection of Leaks in Aircraft Fuel Systems
MIL-V-81356	Valve, Fuel System, Pressurization and Vent
MIL-C-81511	Connector, Electrical, etc.
MIL-C-81975	Coupling, Regulated, Aerial Pressure Refueling Type MA-3
MIL-P-82522	Propellant, Jet Engine, T-h Dimer. Grade RJ-4
MIL-C-83019	Coating, Polyurethane, for Protection of Integral Fuel Tank Sealing Compound
MIL-B-83054	Baffle and Inerting Material, Aircraft Fuel Tank
MIL-T-83133	Turbine Fuel, Aviation, Kerosene Type, Grade JP-8
MIL-T-83219	Truck, Tank A/S32R-9
MIL-T-83240	Transmitter, Rate of Flow, Fuel TRU-113A
MIL-R-83248	Rubber, Fluorocarbon Elastomer, High Temp Fluid and Compression Set Resistant
MIL-C-83291	Covers, Self-Sealing, Fuel Line, Aircraft
MIL-I-83294	Installation Requirements, Aircraft Propulsion Systems, General Specification for
MIL-T-83323	Tester, Universal Receptacle, Aerial Refueling
MIL-C-83413/10	Connectors and Assemblies, Electrical, Aircraft Grounding: Jumper Cable Assembly, Aircraft to Fuel Nozzle, Discharger, Electrostatic
MIL-C-85052	Clamp, Loop, Cushion, General Specification for
MIL-C-85061	Coupling, Fuel Line, Flexible, 125 psi

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2.5 (Continued):

MIL-C-85449	Clamp Assembly, Saddle-Type, Cushion, General Specification for
MIL-P-87107	Propellant, High Density Synthetic Hydrocarbon Type, Grade JP-9 and JP-10
MIL-F-87154	Fuel Systems, General Design Specification
MIL-B-87162	Baffle Material, Explosion Suppression, Expanded Aluminum Mesh, for Aircraft Fuel Tanks
MIL-P-87175	Packing, Preformed, Petroleum, Hydraulic Fluid Resistant, Phosphonitrilic Fluoroelastomer
MIL-N-87963	Nozzle: Fuel, Aircraft, Overwing: Type MD-3

2.6 Military Standards:

MIL-STD-100	Engineering Drawing, Practices (Now DOD-STD-100)
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-190	Identification Marking of Rubber Products
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-210	Climatic Extremes for Military Equipment
MIL-STD-295	Bill of Material, Preparation of
MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462	Electromagnetic Interference Characteristics Measurement of
MIL-STD-470	Maintainability Program Requirements for Systems and Equipments
MIL-STD-471	Maintainability Verification/Demonstration/Evaluation
MIL-STD-490	Specification Practices

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2.6 (Continued):

MIL-STD-701	Lists of Standard Semiconductor Devices
MIL-STD-704	Aircraft Electric Power Characteristics
MIL-STD-781	Reliability Design Qualification and Production Acceptance Tests, Exponential Distribution
MIL-STD-785	Reliability Program for Systems and Equipment Development and Production
MIL-STD-794	Parts and Equipment, Procedures for Packaging of
MIL-STD-801	Inspection and Acceptance Standards for Propulsion Fluid Cells and Fittings
MIL-STD-810	Environmental Test Methods and Engineering Guidelines
MIL-STD-831	Test Reports, Preparation of
MIL-STD-882	System Safety Program Requirements
MIL-STD-889	Dissimilar Metals
MIL-STD-1247	Markings, Functions and Hazard Designations of Hose Pipe, and Tube Lines for Aircraft, Missile and Space Systems
MIL-STD-1290	Light Fixed- and Rotary-Wing Aircraft Crashworthiness
MIL-STD-1518	Storage, Handling, Servicing of Aviation Fuels, Lubricating Oils, and Hydraulic Fluids at Contractor Facilities
MIL-STD-1523	Age Controls of Age-Sensitive Elastomeric Materials (for Aerospace Applications)
MIL-STD-1529	Vendor Substantiation for Aerospace Propulsion System Items
MIL-STD-1568	Materials and Processes for Corrosion Prevention and Control in Aerospace Weapons Systems
MIL-STD-1587	Material and Process Requirements for Air Force Weapon Systems
MIL-STD-1757	Lightning Qualification Test Techniques for Aerospace Vehicles and Hardware

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2.6 (Continued):

MS8000 thru MS8009	Hose Assembly, Tetrafluoroethylene, High Temperature, Medium Pressure
MS16142	Boss, Gasket Seal, St. Thread Tube Fitting
MS21900	Adapter, Flareless Tube to AN Flared Tube
MS21902	Union, Flareless Tube
MS21904	Elbow, Flareless Tube, 90°
MS21905	Tee, Flareless Tube
MS21906	Cross, Flareless Tube
MS21907	Elbow, Flareless Tube and Universal 45°
MS21908	Elbow, Bulkhead Universal 90 Deg., Flareless Tube
MS21909	Tee, Bulkhead and Universal, Flareless Tube
MS21910	Tee, Bulkhead, Flareless Tube, Internal Thread on Side
MS21911	Tee, Bulkhead, Flareless Tube, Internal Thread on Run
MS21912	Tee, Flareless Tube with Bulkhead on Run
MS21913	Plug, Flareless Tube
MS21914	Cap, Pressure Seal, Flareless Tube Fitting
MS21915	Bushing, Screw Thread Expander, Flareless Tube Connection
MS21916	Reducer, External Thread, Flareless Tube
MS21919	Clamp, Loop Type, Cushioned, Support
MS21921	Nut, Sleeve Coupling, Flareless
MS21922	Sleeve, Coupling, Flareless
MS21923	Adapter, Flareless Tube, Bulkhead and Universal to Flared Tube
MS21924	Union, Flareless Tube, Bulkhead and Universal

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2.6 (Continued):

MS21925	Elbow, 90° Universal, Flareless Tube, High Profile
MS21926	Elbow, 90° Universal, Flareless Tube, Low Profile
MS21937	Nut, Cluster Fitting, Retainer
MS21938	Bolt, Cluster Fitting, Single Port, Flareless
MS21939	Bolt, Cluster Fitting, Single Port, Through, Flareless
MS21940	Bolt, Cluster Fitting, Double Port, Flareless
MS21941	Bolt, Cluster Fitting, Double Port, Through, Flareless
MS21942	Body, Cluster Fitting, One Way, Flareless
MS21943	Body, Cluster Fitting, Two Way, 90°, Flareless
MS21944	Body, Cluster Fitting, Two Way, 180°, Flareless
MS21945	Body, Cluster Fitting, Three-Way, Flareless
MS24333	Coupling Assembly, Hydr., Self-Sealing, Quick Disconn., Flared Fitting, etc.
MS24335	Flange, Bulkhead Mounting, Hydraul., Self-Sealing Coupling
MS24354	Drogue Cone, Nozzle and Reception Coupling, Type MA-2, Flight Pressure Refueling
MS24355	Coupling, Reception-Type MA-2, Flight Pressure Refueling, Assembly of
MS24356	Nozzle-Type MA-2, Flight Pressure Refueling
MS24405	Adapter, Flareless Tube to Flared Tube, Precision Type
MS24651	Elbow, Tube - 90°, Bulkhead, Flareless Tube Universal to Flared Tube
MS24652	Elbow, Tube - 90°, Bulkhead, Flared Tube Universal to Flareless
MS24653	Elbow, Tube - 45°, Bulkhead, Flared Tube, Universal to Flareless
MS24654	Elbow, Tube - 45°, Bulkhead, Flareless Tube Universal

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2.6 (Continued):

MS25384	Electrostatic Discharger Jumper, Fuel Nozzle to Aircraft (Use MIL-C-83413/10)
MS27114	Coupling, Clamp, Grooved, V-Band, 1.750 to 14.250 Flange OD (-65° to +800 °F)
MS27115	Coupling, Clamp, Grooved, V-Band, 1.750 to 6.250 Flange OD (-450° to +200 °F)
MS27116	Coupling, Clamp, Grooved, V-Band, 1.750 to 14.250 Flange OD (-320° to +1500 °F)
MS27117	Coupling, Clamp, Grooved, V-Band, 14.250 to 24.250 Flange OD (-320° to +1500 °F)
MS27118	Coupling, Clamp, Grooved, V-Band, 24.250 to 40.250 Flange OD (-320° to +1500 °F)
MS27604	Nozzle-Universal Aerial Refueling Tanker Boom
MS28882	Valve, Fuel Check, Low Pressure, Gasket Seal Straight Thread Connection
MS28884	Valve, Fuel Check, Low Pressure, Flared Tube Connection
MS29512	Packing, Preformed, Hydrocarbon, Fuel Resistant, Tube Fitting, "O" Ring
MS29513	Packing, Preformed, Hydrocarbon Fuel-Resistant, "O" Ring
MS29514	Flange, Adapter Locking, Pressure Fuel Servicing
MS29520	Nozzle, Pressure Fuel Servicing Locking, Aircraft, Type D-1
MS29521	Disk Valve
MS29525	Cap, Pressure Fuel Servicing, Aircraft 2-1/2" Flush Type
MS29526	Cap, Pressure Fuel Servicing, Nominal, 2-1/2" Non-Flush Type
MS33514	Fitting End, Std. Dimensions Flareless Tube Connection and Gasket Seal

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2.6 (Continued):

MS33515	Fitting End, Standard Dimensions for Bulkhead Flareless Tube Connections
MS33566	Fittings, Installation of Flareless Tube, Straight-Threaded Connectors
MS33581	Flange, Attachment, Molded Tank, "O" Ring, General Features of Construction
MS33583	Tubing End - Double Flare, Std. Dimen. for
MS33584	Tubing End - Standard Dimen. for Flared
MS33611	Tube Bend Radii
MS33645	Receptacle, Grounding, Installation of (Use MIL-C-83413)
MS33649	Boss, Fluid Connection-Internal Straight Thread
MS33656	Fitting End, Standard Dimension for Flared Tube Connection and Gasket Seal
MS33657	Fitting End, Standard Dimensions for Bulkhead Flared Tube Connections
MS33666	Packing, Preformed-Aeronautical, Elastomeric, Range of Sizes
MS33668	Packing, Preformed, Elastomeric, Tube Fitting, Range of Sizes
MS33786	Fitting Installation, Flared Tube and Hose, Swivel

2.7 Society of Automotive Engineers Standards and Practices:

ARP492	Aircraft Engine Fuel Pump Cavitation Endurance Test
AS568	Aerospace Size Standard for O-Rings
ARP594	Fuel Pump Thermal Safety Design
MAP749	Aircraft Turbine Engine Fuel System Component Endurance Test (Contaminated Fuel)
AIR790	Considerations of Ice Formation in Aircraft Fuel Systems
ARP868	Pressure Drop Test for Fuel System Components

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2.7 (Continued):

AIR869	Application of V-Band Coupling
AIR1082	Fluid System Component Specification Preparation Criteria
AIR1184	Fuel Gaging System Accuracies
ARP1231	Gland Design, Elastomeric "O" Ring Seals, General Considerations
ARP1232	Gland Design, Elastomeric "O" Ring Seals, Static Radial
AS1284	Standard Test Procedure and Limit Value for Shut-off Surge Pressure of Pressure Fuel Dispensing Systems
AIR1326	Aircraft Fuel System Vapor-Liquid Ratio Parameter
ARP1400	Recommended Practices for General Aviation Filters, Reciprocating Engine (Piston Type) Aircraft
ARP1401	Aircraft Fuel System and Component Icing Test
ARP1405	Uniform Measurement Units for Leakage Rates
AIR1406	Lightning Protection and Static Electrification
AIR1408	Aerospace Fuel System Specifications and Standards
AIR1482	Fuel and Oil System Schematic Diagrams Recommendations for Symbols
AS1576	Fittings, Welded, Hydraulic, Titanium and Corrosion Resistant Steel, 3000 psi Hydraulic
AS1577	Tube End, Welding, 3000 psi Hydraulic
AS1578	Bellmouth Tube End, Welding, Hydraulic
AS1579	Fitting End, Welded Girth Joint, Dimensions, 3000 psi Hydraulic
AS1580	Ring, Tube Weld, 3000 psi, Hydraulic, Titanium
AS1581	Sleeve, Flareless Tube End, Welded, 3000 psi Hydraulic
AS1582	Union, Flareless Tube End, Welded, 3000 psi Hydraulic

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2.7 (Continued):

AS1583	Tee-Tube Weld, 3000 psi Hydraulic
AS1584	Elbow, 90° Tube Weld, 3000 psi Hydraulic
AS1585	Reducer-Tube Weld, 3000 psi Hydraulic
AIR1615	Thesaurus for Fuel System Components
AIR1616	Self-Sealing Breakaway Valves for Crash-Resistant Aircraft Fuel Systems
AIR1660	Fuel Level Control Valves/Systems
AIR1662	Minimization of Electrostatic Hazards in Aircraft Fuel Systems
AIR1664	Aircraft Flexible Tanks, General Design and Installation Recommendations
ARP1665	Definition of Pressure Surge Test and Measurement Methods for Receiver Aircraft
AS1710	Coupling, Fuel, Flexible, Variable Cavity Threaded Type with Ferrules
AS1711	Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends, Envelope Dimensions
AS1712	Coupling Sub-Assembly, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends
AS1713	Half Coupling Sub-Assembly, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends
AS1714	Nut Assembly, Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends
AS1715	Washer, Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends
AS1716	Ferrule, Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends
AS1717	Retainer, Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends

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2.7 (Continued):

AS1718	Coupling Body, Flexible, Variable Cavity, Threaded, Ferrule Type Tube Ends
AS1719	Fitting End, Half-Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type Design Standard
AS1720	Ferrule End, Coupling, Flexible, Variable Cavity, Threaded, Ferrule Type, Design Standard
AS1730	Coupling, Fuel, Rigid, Threaded Type
AS1731	Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends, Envelope Dimensions
AS1732	Body, Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends, Type I
AS1733	Body, Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends, Type II
AS1734	Nut, Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends, Type I
AS1735	Nut, Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends, Type II
AS1736	Washer, Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends
AS1737	Ferrule, Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends
AS1738	Nut Assembly Coupling, Rigid, Fixed Cavity, Threaded, Ferrule Type Tube Ends, Type I and Type II
AS1748	Fitting End, Half-Coupling, Flexible, Variable Cavity, Threaded, Beaded, Design Standard
MAP1794	Ball-on-Cylinder (BOC) Aircraft Turbine Fuel Lubricity Tester
ARP1797	Aircraft and Aircraft Engine Fuel Pump Low Lubricity Fluid Endurance Test

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3. COMPONENT LIST (REFER TO MASTER LIST FOR COMPLETE TITLE):

3.1 Total System and Subsystem Specification:

FAA Technical Standard Orders:

TSO-C77 APU, Gas Turbine

Military Specifications:

MIL-E-5007 Engine, Turbojet & Turbofan

MIL-E-8593 Engine, Turboprop

MIL-F-8615 Fuel System Components

MIL-P-8686 APU Aircraft

MIL-F-17874 Fuel Systems, Aircraft, Installations

MIL-A-19736 Air Refueling, System

MIL-A-22847 Air Refueling Store, D-704

MIL-F-38363 Fuel System, General Specification

MIL-F-87154 Fuel Systems, General Specification

SAE Documents:

AIR790 Ice Formation, Fuel Systems

ARP868 Pressure Drop, Components

AIR1082 Specification Criteria, Components

AIR1326 Vapor-Liquid Ratio Parameter

ARP1401 Icing Tests

ARP1405 Measurement, Leakage Rates

AIR1406 Lightning Protection

AIR1408 Specification and Standards, Systems

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3.1 (Continued):

AIR1482	Schematic Diagrams, Recommended Symbols
AIR1615	Thesaurus, Components
AIR1662	Electrostatic Hazards

3.2 Couplings and Clamps:

Military Specifications:

MIL-C-7413	Coupling, Quick Disconnect
MIL-C-8603	Clamp, Tube Support
MIL-C-22263	Coupling, Flexible, 125 psi
MIL-C-25162	Coupling, Flight Refueling, Type MA-2
MIL-C-27536	Coupling Clamp Grooved, V-Band
MIL-C-81975	Coupling, Flight Refueling, Type MA-3
MIL-C-85052	Clamp, Loop, Cushion
MIL-C-85449	Clamp Assembly, Saddle-type

Military Standards:

MS21919	Clamp, Loop Type, Cushioned Support
MS24333	Coupling Assembly, Quick Disconnect
MS24355	Coupling, Reception, Pressure Refueling
MS27114	Coupling, 1.750 to 14.250 Flange OD
MS27115	Coupling, 1.750 to 6.250 Flange OD
MS27116	Coupling, 1.750 to 14.250 Flange OD
MS27117	Coupling, 14.250 to 24.250 Flange OD
MS27118	Coupling, 24.250 to 40.250 Flange OD

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3.2 (Continued):

SAE Standards:

AIR869	Coupling, V-Band
AS1650	Coupling, Flexible, Fixed Cavity, Threadless Type W/Ferrules
AS1651	Coupling, Fixed, Threadless, Dimensions
AS1652	Flange, Coupling
AS1653	Sleeve, Coupling
AS1654	Retaining Device, Coupling
AS1710	Coupling, Flexible, Variable Cavity Threaded Type With Ferrules
AS1711	Coupling, Variable, Threaded, Ferrule Type, Dimensions
AS1712	Coupling Sub-Assembly, Threaded, Ferrule
AS1713	Half Coupling Sub-Assembly, Threaded, Ferrule
AS1714	Nut Assembly, Coupling, Threaded, Ferrule
AS1715	Washer, Coupling, Threaded, Ferrule
AS1716	Ferrule, Coupling, Threaded, Ferrule
AS1717	Retainer, Coupling, Threaded, Ferrule
AS1718	Coupling Body, Threaded, Ferrule
AS1719	Fitting End, Half-Coupling, Threaded, Ferrule Design Standard
AS1720	Ferrule End, Coupling, Threaded, Ferrule Design Standard
AS1730	Coupling, Rigid, Threaded Type
AS1731	Coupling, Fixed, Threaded, Ferrule Type, Dimensions
AS1732	Body, Coupling, Threaded, Ferrule, Type I
AS1733	Body, Coupling, Threaded, Ferrule, Type II

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3.2 (Continued):

AS1734	Nut, Coupling, Threaded, Ferrule, Type I
AS1735	Nut Assembly, Coupling, Threaded Ferrule, Type II
AS1736	Washer, Coupling, Threaded, Ferrule
AS1737	Ferrule, Coupling, Threaded, Ferrule
AS1738	Nut Assembly, Coupling, Fixed Cavity, Threaded, Type I
AS1740	Coupling, Flexible, Variable Cavity, Threaded Type, Beaded
AS1741	Coupling, Flexible, Variable, Threaded, Beaded Envelope Dimensions
AS1742	Coupling Sub-Assembly, Threaded, Beaded
AS1743	Half Coupling Sub-Assembly, Flexible, Variable Cavity, Threaded, Beaded
AS1744	Nut Assembly, Coupling, Threaded, Beaded
AS1745	Washer, Coupling, Threaded, Beaded
AS1746	Retainer, Coupling, Threaded, Beaded
AS1747	Coupling Body, Threaded, Beaded Tube
AS1748	Fitting End, Half-Coupling, Threaded, Beaded, Design Standard

3.3 Filters and Strainers:

Military Specifications:

MIL-S-8710	Strainer, General Specification
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SAE Standards:

ARP1400	Filter, General Aviation, Reciprocating Engine
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3.4 Fuels and Fluids:

Federal Specifications:

P-D-680	Dry Cleaning Solvent
TT-S-735	Test Fluids, Hydrocarbon
VV-G-109	Gasoline, Unleaded
VV-G-1690	Gasoline, Automotive

Military Specifications:

MIL-F-5572	Fuel, Reciprocating Engine
MIL-T-5624	Fuel, JP4 and JP5
MIL-C-7024	Fluid, Calibrating
MIL-I-25017	Inhibitor, Corrosion
MIL-J-25656	Fuel, JP-6
MIL-F-27351	Fluid, Calibrating, High Flash Point
MIL-I-27686	Inhibitor, Ice
MIL-T-38219	Fuel, JP-7
MIL-F-82522	Fuel, RJ-4
MIL-T-83133	Fuel, JP-8
MIL-P-87107	Propellant, JP-9 & JP-10

SAE Standards:

MAP1794	Tester, BOC Lubricity
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3.4 (Continued):

Other Specifications:

ASTM D 1655	Fuels, Type A, A-1, B
DDA/GM EMS64	Fuel, Turbine Engine
D50TF2-54	Aviation Turbine Fuels
PWA522 (SB #2016)	Fuel, Commercial Aircraft Turbine Engine

3.5 Gaskets and Packing:

Military Specifications:

MIL-P-5315	Packing, Preformed
MIL-R-6855	Rubber, Synthetic
MIL-S-8802	Sealing Compound, Integral Tanks
MIL-R-25988	Rubber, Fluorosilicone
MIL-C-83019	Coating, Integral Tank Seals
MIL-C-83248	Rubber, Fluorocarbon

Military Standards:

MIL-STD-190	Rubber Products, Identification
MIL-STD-794	Parts and Equipment, Packing
MIL-STD-1523	Elastomeric Materials, Age Control
MS29512	Packing, "O" Ring, Tube
MS29513	Packing, "O" Ring, Fuel Resistant

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3.5 (Continued):

SAE Standards:

AS568	"O"-Ring Size Standard
ARP1231	Gland Design, "O" Ring Seals, General Spec
ARP1232	Gland Design, "O" Ring Seals, Static Radial

3.6 Hoses, Lines and Fittings:

FAA Technical Standard Orders:

TSO-C53	Fuel and Oil Hose Assemblies
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Federal Specifications:

WW-T-700E/GEN	Tubing, Aluminum, Seamless, Specification
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Military Specifications:

MIL-H-4495	Hose, Rubber, In-flight Refueling
MIL-A-5070	Adapter, Hose to Tube, Reusable
MIL-H-7061	Hose, Self-Sealing
MIL-T-8606	Tubing, Steel
MIL-H-8794	Hose, Rubber, Fuel Resistant
MIL-H-8795	Hose Assemblies
MIL-F-18280	Fittings, Flareless Tube, Fluid Connection
MIL-F-18802	Lines, Installation
MIL-H-25579	Hose Assembly, High Temp, Med. Pressure
MIL-A-38726	Adapter Assembly, Reusable

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3.6 (Continued):

Military Standards:

MIL-STD-1247	Pipe, Hose, Tube Lines, Identification
MS8000 thru MS8009	Hose Assembly, Teflon, High Temp, Medium Pressure
MS21900	Adapter, Flareless to AN Flared
MS21902	Union, Flareless
MS21904	Elbow, Flareless, 90°
MS21905	Tee, Flareless
MS21906	Cross, Flareless
MS21907	Elbow, Flareless and Universal 45°
MS21908	Elbow, Bulkhead Universal 90 Deg., Flareless
MS21909	Tee, Bulkhead and Universal, Flareless
MS21910	Tee, Flareless, Internal Thread on Side
MS21911	Tee, Flareless, Internal Thread on Run
MS21912	Tee, Flareless, Bulkhead on Run
MS21913	Plug, Flareless
MS21914	Cap, Pressure Seal, Flareless Fitting
MS21915	Bushing, Thread Expander, Flareless
MS21916	Reducer, External Thread, Flareless
MS21921	Nut, Sleeve Coupling, Flareless
MS21922	Sleeve, Coupling, Flareless
MS21923	Adapter, Flareless, Bulkhead and Universal
MS21924	Union, Flareless Bulkhead and Universal

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3.6 (Continued):

MS21925	Elbow, 90° Universal, Flareless, High Profile
MS21926	Elbow, 90° Universal, Flareless, Low Profile
MS21937	Nut, Cluster Fitting, Retainer
MS21938	Bolt, Cluster Fitting, Single Port, Flareless
MS21939	Bolt, Cluster Fitting, Single Port, Through, Flareless
MS21940	Bolt, Cluster Fitting, Double Port, Flareless
MS21941	Bolt, Cluster Fitting, Double Port, Through, Flareless
MS21942	Body, Cluster Fitting, One Way, Flareless
MS21943	Body, Cluster Fitting, Two Way, 90°, Flareless
MS21944	Body, Cluster Fitting, Two Way, 180°, Flareless
MS21945	Body, Cluster Fitting, Three-Way, Flareless
MS24335	Flange
MS24405	Adapter, Flareless to AN Flared, Precision
MS24651	Elbow, 90°, Bulkhead, Flareless to Flared
MS24652	Elbow, 90°, Bulkhead, Flared to Flareless
MS24654	Elbow, 45°, Bulkhead, Flareless to Flared
MS33481	Flange, Attachment
MS33514	Fitting End, Dimensions, Flareless Tube Connection and Gasket Seal
MS33515	Fitting End, Dimensions, Bulkhead Flareless Tube Connections
MS33566	Fittings, Installation, Flareless Tube, Straight-Threaded Connectors
MS33583	Tubing End, Double Flare
MS33584	Tubing End, Flare