

AEROSPACE HYDRAULIC AND PNEUMATIC SPECIFICATIONS AND STANDARDS

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1. SCOPE:

This report lists military and industry specifications and standards which are used in aerospace hydraulic and pneumatic systems. It is intended as a supplement to specifications MIL-H-5440 and MIL-P-5518. Only those hardware standards which have been specifically designed for hydraulic or pneumatic use are listed. Revisions and amendments which are current for these specifications and standards are not listed. Order of procedure for the selection of specifications and standards is covered by MIL-STD-970.

1.1 Listing Documents: Attention is called to the following documents which list specifications and standards and are used as a basis for this report.

1.1.1 Military Standards: Department of Defense, Index of Specifications and Standards (DoDISS), prepared by the DOD Standardization Programs and Documents Division, Washington, DC 20362. This document is published annually, with bimonthly cumulative supplements.

1.1.2 SAE Publications: SAE Aerospace Standards (AS), Aerospace Recommended Practices (ARP), Aerospace Information Reports (AIR), Index and AMS Index. These documents are published annually by SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2. SPECIFICATIONS:

2.1 Federal Specifications:

BB-N-411	Nitrogen Technical
C-F-206	Felt, Sheet, Wool, Pressed
VV-P-236	Petrolatum, Technical
WW-T-700/4	Tube, Aluminum Alloy, Drawn, Seamless, 5052
WW-T-700/6	Tube, Aluminum Alloy, Drawn, Seamless, 6061

2.2 Military Specifications:

2.2.1 System and Subsystem Specifications:

MIL-H-5440	Hydraulic Systems, Aircraft, Types I and II, Design, Installation, and Data Requirements for
MIL-P-5518	Pneumatic Systems, Aircraft, Design, Installation and Data Requirements for
MIL-B-8075	Brake Control Systems, Anti Skid, Aircraft Wheels, Instructions for Preparation of Specifications for
MIL-B-8584	Brake Systems, Wheel, Aircraft, Design of
MIL-S-8812	Steering System; Aircraft, General Specification for
MIL-H-8891	Hydraulic Systems, Manned Flight Vehicles, Type III, Design, Installation, and Data Requirements for
MIL-F-9490	Flight Control Systems, Design, Installation, and Test of, General Specification for
MIL-F-18372	Flight Control Systems; Design, Installation, and Tests of, Aircraft, (General Specification for)
MIL-A-18717	Arresting Hook Installations, Aircraft

2.2.1 System and Subsystem Specifications: (Continued)

MIL-H-25475	Hydraulic Systems, Missile, Design, Installation, Tests, and Data Requirements (General Requirements for)
MIL-H-87227	Hydraulic Power Systems

2.2.2 Design Details and Test Specifications:

MIL-B-5087	Bonding, Electrical, and Lighting Protection, for Aerospace Systems
MIL-W-5088	Wiring, Aerospace Vehicle
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification for (Replaced by MIL-STD-810)
MIL-G-5514	Gland Design, Packings, Hydraulic, General Requirements for
MIL-T-5522	Test Procedure for Aircraft Hydraulic and Pneumatic Systems, General
MIL-C-6021	Castings, Classification and Inspection of (for Aeronautical Applications)
MIL-T-6053	Tests, Impact, Shock Absorber, Landing Gear, Aircraft
MIL-I-6181	Interference Control Requirements Aircraft Equipment
MIL-I-6866	Inspection, Penetrant Method of
MIL-I-6868	Inspection Process, Magnetic Particle
MIL-P-7105	Pipe Threads, Taper, Aeronautical National Form, Symbol ANPT, General Requirements for
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specification for
MIL-W-8160	Wiring, Guided Missile, Installation of, General Specification for
MIL-F-8785	Flying Qualities of Piloted Airplanes
MIL-S-8879	Screw Thread, Controlled Radius Root with Increased Minor Diameter, General Specification for
MIL-D-23615	Design and Evaluation of Cartridge Actuated Devices

2.2.3 Component Specifications:

2.2.3.1 General Component Specifications:

MIL-W-5013	Wheel and Brake Assemblies; Aircraft
MIL-A-5498	Accumulator, Aircraft Hydropneumatic Pressure
MIL-A-5503	Actuators, Aeronautical, Linear Utility, Hydraulic
MIL-J-5513	Joints, Hydraulic Swivel
MIL-R-5520	Reservoirs, Aircraft, Hydraulic, Non-Separated Type
MIL-V-5525	Valves, Aircraft Power Brake
MIL-P-5954	Pump Unit, Hydraulic, Electric Motor Driven, Fixed Displacement
MIL-P-5994	Pump, Hydraulic, Electric-Motor-Driven, Variable Delivery
MIL-C-6026	Control Unit, Pressure Generating, Manually Operated Aircraft Hydraulic Brake System

2.2.3.1 General Component Specifications: (Continued)

MIL-C-6388	Compressor Unit, Air, Aircraft, Shaft Power Driven, General Specification for
MIL-C-6591	Compressor Unit, Aircraft Electric Motor Driven, General Specification for
MIL-T-7101	Transmission, Power, Constant Speed, 60/25 KW
MIL-C-7979	Cylinders, Hydraulic Brake, Master, Power Assisted
MIL-M-7997	Motors, Aircraft Hydraulic, Constant Displacement
MIL-G-8402	Gages, Pressure, Dial Indicating, General Specification for
MIL-L-8552	Landing Gear, Aircraft Shock Absorber (Air - Oil Type)
MIL-P-8564	Pneumatic Components, Aeronautical, General Specification for
MIL-R-8573	Reservoirs, Air, Nonshatterable Steel
MIL-H-8775	Hydraulic Systems Components, Aircraft and Missiles, General Specification for
MIL-C-8838	Cylinder, Pneumatic Actuating, Aircraft Utility System, General Specification for
MIL-H-8890	Hydraulic Components, Type III, (-65 Deg. to +450 Deg. F) General Specification for
MIL-R-8931	Reservoirs, Aircraft and Missile, Hydraulic, Separated Type
MIL-S-8932	Switch, Pressure, Aircraft, General Specification for
MIL-S-8959	Spring, Hydraulic, General Specification for
MIL-P-17869	Pumps and Motors, Power, Oil Hydraulic
MIL-P-19692	Pumps, Hydraulic, Variable Delivery, General Specification for
MIL-T-25363	Tank, Pneumatic Pressure, Aircraft, Glass Fiber
MIL-C-26805	Compressor Units, Air, General Requirements for
MIL-D-26939	Drive Assembly, Constant Speed, Hydraulic, Type MD-1
MIL-V-27162	Valves, Servo Control, Electric-Hydraulic, General Specification for
MIL-V-81940	Valve, Sampling and Bleed, Hydraulic, Type II Systems
MIL-D-83099	Drive Assembly, Constant Speed, General Specification for

2.2.3.2 Detail Component Specifications:

MIL-V-5461	Valve, Vacuum Breaking
MIL-A-5498	Accumulators, Aircraft Hydropneumatic Pressure
MIL-F-5504	Filters and Filter Elements, Fluid Pressure, Hydraulic Micronic Type
MIL-F-5508	Fuses; Aircraft, Automatic Quantity Measuring, Hydraulic
MIL-P-5515	Pump, Hydraulic Ram, Hand Driven
MIL-V-5519	Valve Regulating Fluid Pressure
MIL-V-5523	Valve; Relief, Hydraulic Pressure
MIL-V-5524	Valves; Check, Hydraulic, Aircraft, Type I Systems
MIL-V-5527	Valves; Aircraft, Hydraulic Thermal Expansion Relief
MIL-V-5529	Valves; Hydraulic Directional Control, Rotary Selector
MIL-V-5530	Valves; Aircraft Hydraulic Shuttle
MIL-V-6618	Valve, Stop Check, Purge, Manifold Pressure Gage Line
MIL-I-6839	Indicator, Position, Landing Gear
MIL-I-7084	Indicator, Pressure, Hydraulic, 0 - 4000 PSI

2.2.3.2 Detail Component Specifications: (Continued)

MIL-T-7612	Test Stand, Hydraulic System, Gasoline Engine Driven, Type D-5A
MIL-G-7734	Gages, Pressure, Engine and Utility, Aircraft
MIL-P-7858	Pump, Hydraulic, Power Driven, Fixed Displacement
MIL-C-7905	Cylinders, Compressed Gas, Nonshatterable
MIL-V-8566	Valves, Aircraft Hydraulic Flow Regulator
MIL-R-8572	Reducers, Pneumatic Pressure, Aircraft
MIL-V-8813	Valves; Aircraft, Hydraulic Pressure Relief, Type II Systems
MIL-F-8815	Filter and Filter Elements, Fluid Pressure, Hydraulic Line, 15 Micron Absolute, Type II Systems
MIL-A-8897	Accumulators, Hydraulic, Cylindrical, 3000 PSI, Type II
MIL-R-8931	Reservoirs: Aircraft and Missile, Hydraulic, Separated Type
MIL-P-9388	Pump, Pressure, Oil-free Air, Type MA-2
MIL-P-9389	Pump, Pressure, Oil-free Air, Type MA-3
MIL-V-19067	Valves, Check, Controllable, Hydraulic, Aircraft, Type II Systems
MIL-V-19068	Valves, Shuttle, Hydraulic, Aircraft, Type II Systems
MIL-V-19069	Valves, Check, Hydraulic, Aircraft, Type II Systems
MIL-V-19593	Valve-Control, Aircraft, Pneumatic 28-Volt D-C Solenoid Operated
MIL-T-25307	Transmitter, Pressure, Hydraulic, Type MJ1
MIL-G-25308	Gages, Pressure, Dial Indicating, Hydraulic, Type ME-1
MIL-C-25427	Couplings, Aircraft Hydraulic Self-Sealing Quick-Disconnect
MIL-V-25675	Valves, Check, Hydraulic, Aircraft and Missile, Type III Systems
MIL-F-25682	Filter and Filter Element, Fluid Pressure, Hydraulic, Absolute, 25 Micron, Minus 65 Deg. to Plus 459 and Plus 600 Deg. F
MIL-G-25867	Gage, Pressure, Dial Indicating, Pneumatic
MIL-G-25987	Gage, Pressure, Dial Indicating, General Purpose, Aircraft
MIL-T-26398	Test Stand, Aircraft Hydraulic System, Trailer-Mounted, A/M27T-2, Electric-Motor-Driven, Triple System
MIL-S-26874	Stand, Test, Aircraft Hydraulic System, Gasoline-Engine-Driven, Type MJ-1
MIL-S-26877	Stand, Test, Aircraft Hydraulic System, Gasoline-Engine-Driven, Type MJ-2A
MIL-V-26880	Valve, Diaphragm Actuated, Hydraulically Operated, Pressure Reducing and Check
MIL-I-27190	Indicator Pressure AGU-3-A, Hydraulic, 0-4000 psi
MIL-F-27656	Filter, Fluid, Pressure, Absolute 25 Micron, Hydraulic
MIL-P-38027	Pressure Indicating System, Hydraulic A/A27J-1

2.2.4 Part Specifications:

MIL-F-3541	Fittings, Lubrication
MIL-S-4040	Solenoid, Electrical, General Specification for
MIL-P-4861	Packing, Preformed, Rubber, Packaging of
MIL-S-5049	Scrapers; Piston Rod

2.2.4 Part Specifications: (Continued)

MIL-A-5070	Adapter, Hose to Tube, Pipe and Flange, Reusable, Hydraulic, Pneumatic, Fuel and Oil Lines
MIL-C-5499	Cores, Aircraft High Pressure Air Valves
MIL-C-5500	Caps; High Pressure Air Valves
MIL-C-5501	Caps and Plugs, Protective, Dust and Moisture Seal
MIL-F-5509	Fittings; Fluid Connection
MIL-P-5510	Packing, Preformed, Straight Thread Tube Fitting Boss, Type I Hydraulic
MIL-P-5516	Packing, Preformed. Petroleum Hydraulic Fluid Resistant, 160°F
MIL-W-5521	Washer, Aircraft Hydraulic Packing Back-Up
MIL-H-5593	Hose, Aircraft Low Pressure Flexible
MIL-V-6164	Valve, Aircraft, Air, High Pressure
MIL-P-6906	Plates-Identification
MIL-T-8504	Tubing, Steel, Corrosion Resistant #304, Aerospace Vehicle Hydraulic Systems. Annealed, Seamless and Welded
MIL-C-8603	Clamps, Tube Support, Loop Type
MIL-H-8788	Hose, Hydraulic, High Pressure
MIL-F-8789	Fitting End, Attachable, Hydraulic, High Pressure Hose
MIL-H-8790	Hose Assembly, Rubber, Hydraulic, High Pressure (3000 psi)
MIL-R-8791	Retainer, Packing, Hydraulic, and Pneumatic, Tetrafluoroethylene Resin
MIL-H-8794	Hose, Rubber, Aircraft, Hydraulic and Pneumatic, Fuel and Oil Resistant
MIL-H-8795	Hose Assembly, Rubber, Aircraft, Hydraulic, Fuel and Oil Resistant
MIL-F-8839	Fittings, Lubrication, Drive Type
MIL-D-9898	Drawings, Tube Bend
MIL-F-18280	Fittings, Flareless, Fluid Connection
MIL-H-25579	Hose Assembly, Tetrafluoroethylene, High Temperature, Medium Pressure, General Requirements for
MIL-P-25732	Packing, Preformed, Petroleum Hydraulic Fluid Resistant, 275°F
MIL-H-26666	Hose Assembly, Pneumatic High Pressure
MIL-H-27267	Hose, Tetrafluoroethylene, High Temperature, Medium Pressure
MIL-H-27272	Fitting, Hose, Tetrafluoroethylene, High Temperature, Medium Pressure, General Requirements for
MIL-H-38360	Hose Assembly, Tetrafluoroethylene, High Temperature, High Pressure, Hydraulic and Pneumatic
MIL-H-38390	Hose Assembly, Tetrafluoroethylene, Pneumatic High Pressure
MIL-A-38726	Adapter Assembly, Reusable, Flexible Hose, Low Pressure
MIL-C-85052	Clamp, Cushion, General Specification for

2.2.5 Materials, Processes and Miscellaneous Specifications:

MIL-G-4343	Grease, Pneumatic System
MIL-A-5092	Adhesive, Rubber (Synthetic and Reclaimed Rubber Base)
MIL-C-5541	Chemical Films for Aluminum and Aluminum Alloys

2.2.5 Materials, Processes and Miscellaneous Specifications: (Continued)

MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft and Ordnance
MIL-M-6002	Marking, Standard Hose Aircraft
MIL-H-6083	Hydraulic Fluid, Petroleum Base, Preservative
MIL-T-6845	Tubing, Steel, Corrosion-Resistant #304, Aerospace Vehicle Hydraulic System, 1/8 Hard Condition
MIL-I-6869	Impregnants for Aluminum Alloy and Magnesium Alloy Castings
MIL-T-7081	Tubing, Aluminum Alloy, Seamless, Round 6061, Aircraft Hydraulic Quality
MIL-F-7179	Finishes and Coatings; General Specification for Protection of Aerospace Weapons Systems, Structures and Parts
MIL-E-8189	Electronic Equipment, Missiles, Boosters and Allied Vehicles, General Specification for
MIL-H-8446	Hydraulic Fluid, Nonpetroleum Base, Aircraft
MIL-I-8474	Inspection of Aluminum Alloy Parts, Anodizing Process for
MIL-T-8504	Tubing, Steel, Corrosion-Resistant (18-8) Annealed, Aircraft Hydraulic System
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-T-8808	Tubing, Steel, Corrosion-Resistant (18-8 Stabilized) Aircraft Hydraulic Quality
MIL-T-10727	Tin Plating Electrodeposited or Hot Dipped for Ferrous and Non-Ferrous Metals
MIL-T-25456	Tester, Hose Assemblies, Hydraulic, Pneumatic, Fuel, and Oil, Aircraft
MIL-R-25897	Rubber, High-Temperature, Fluid Resistant
MIL-R-25988	Rubber, Silicone, Oil and Fuel Resistant
MIL-C-26074	Coating, Nickel Phosphorous Electroless Nickel, Requirements for
MIL-P-27401	Propellant Pressurizing Agent, Nitrogen
MIL-P-27407	Propellant Pressurizing Agent, Helium
MIL-H-46004	Hydraulic Fluid, Petroleum Base, Missile
MIL-H-81019	Hydraulic Fluid, Petroleum Base, Ultra-Low, Temperature
MIL-S-81087	Silicone Fluid, Chlorinated Phenyl Methyl Polysiloxane
MIL-H-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, NATO Code # H-537
MIL-P-83461	Packing, Preformed, Petroleum Hydraulic Fluid Resistant, Improved Performance at 275 Degrees F (135 Degrees C)
MIL-F-85421	Fittings, Tube, Fluid Systems, Separable, Dynamic Beam Seal, General Requirements for
QQ-N-290	Nickel Plating (Electrodeposited)
QQ-C-320	Chromium Plating (Electrodeposited)
QQ-Z-325	Zinc Coating (Electrodeposited)
QQ-S-365	Silver Plating (Electrodeposited)
QQ-P-416	Plating, Cadmium (Electrodeposited)
AMS 2419	Cadmium - Titanium Alloy Plating

2.3 Industry Specifications:

2.3.1 SAE Specifications:

ARP219	Procedure and Methods for Conducting Test of Hydraulic Components in Contamination Controlled System
AS227	Wheels and Brakes, Minimum Requirements for Civil Aircraft Applications
AS408	Pressure Instruments - Fuel, Oil, and Hydraulic (Reciprocating Engine Powered Aircraft)
AS483	Skid Control Equipment
ARP490	Electrohydraulic Flow-Control Servovalves
ARP560	Missile Hydraulic Pumps
ARP575	Filter Patch Testing Procedures for Aerospace Hydraulic Pumps and Motors
ARP578	Detail Requirements for 4000 and 5000 psi Aircraft Hydraulic Systems
AS595	Civil Type Aircraft Variable Delivery Hydraulic Pump
ARP597	Wheels and Brakes, Supplementary Criteria for Design Endurance - Civil Transport Aircraft
ARP598	The Determination of Particulate Contamination in Liquids by the Particle Count Method
ARP599	A Dynamic Test Method for Determining the Degree of Cleanliness of the Downstream Side of Filter Elements
ARP600	Torque Determination, Method of, for Tube or Hose End Fitting Connections, Flared, Flareless or Miscellaneous Screw Thread Style
ARP603	Impulse Testing of Hydraulic Hose, Tubing, and Fitting Assemblies
AS604	Hose Assembly, Tetrafluoroethylene, 400°F, 3000 psi Hydraulic, Heavy Braid
AS611	Tetrafluoroethylene Hose Assembly Cleaning Methods
AS614	Hose Assembly, Tetrafluoroethylene, Heavy Duty, High Temperature, High Pressure, 4000 psi (27 580 kPa) Hydraulic and Pneumatic
AS620	High Temperature Hose Assembly, Convolute - Tetrafluoroethylene, for Aircraft
AS683	Installation Procedures and Torques for Fluid Connections
ARP699	High Temperature Pneumatic Duct Systems for Aircraft
AS714	Aircraft Hydraulic Start Motor
ARP719	Gas Motor
ARP739	Gas Power Servos and Reaction Control Systems
ARP743	Procedure for the Determination of Particulate Contamination of Air in Dust Controlled Spaces by the Particle Count Method
AIR744	Auxiliary Power Sources for Aerospace Applications
ARP745	General Components Specification for Explosive Actuated Valves One Cycle
ARP763	Accumulators, Ground, Hydropneumatic Pressure
ARP777	Gas Actuators (Linear and Vane Rotary Type)

2.3.1 SAE Specifications: (Continued)

ARP785	Procedure for the Determination of Particulate Contamination in Hydraulic Fluids by the Control Filter Gravimetric Procedure
AIR787	Filter Element Cleaning Methods
ARP804	Brake Release Response Time Required for Automatic Skid Control
ARP820	Physical and Performance Tests for Type II (-65 to +275 F) O-Ring Packings, 3000 psi Hydraulic Service
ARP824	Hose Assemblies, Flexible Metal, High Pressure and High Temperature
AIR839	Recommended Materials and Practices for Use with Cryogenic Propellants
ARP862	Skid Control Performance Evaluation
AIR887	Liquid Filter Ratings, Parameters and Tests
AIR888	Recommended Standard for Aerospace Filter Element Fine Wire Mesh
ARP891	Determination of Aluminum Alloy Tempers Through Electrical Conductivity Measurements
ARP899	Tube Fittings, Fluid Systems, Permanent Type, General Requirements for
ARP900	Evaluating Cryogenic Filters, Methods for
AIR901	Bubble-Point Test Method
ARP907	Missile and Rocket Applications: Hose Assemblies, Flexible Metal, High Temperature and High Pressure
AS943	Starter, Pneumatic, Aircraft Engine, General Specification for
AIR944	Pneumatic Ground Power Supplies for Starting Aircraft
AIR974	Long-Term Storage of Missile Hydraulic Systems
ARP986	Guide for Qualification Testing of Aircraft Air Valves
ARP988	Electrohydraulic Mechanical Feedback Servoactuators
ARP993	Fluidic Technology
AIR999	Cryogenically Fueled Dynamic Power Systems
AS1055	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components
AIR1064	Brake Dynamics
AIR1077	Metallic Seal Rings for High Temperature Reciprocating Hydraulic Service
AIR1083	Hydraulic System Survivability for Military Aircraft
ARP1084	Hydraulic External Leakage for In-Service Components
ARP1185	Flexure Testing of Hydraulic Tubing Joints and Fittings
AIR1186	Installation and Use of Equilateral Triangle Cross-Section Hydraulic O-Ring Seal Backup Rings (Dyna-Bak)
ARP1192	Procedure for Calibration and Verification of Liquidborne Particle Counter: An Absolute Standard
AIR1243	Anti-Blow-By Design Practice for Cap Strip Seals
ARP1254	Fluidics Test Methods and Instrumentation
ARP1281	Actuators; Aircraft Flight Controls, Power Operated, Hydraulic, General Specification for
ARP1302	Filter Patch Testing Procedures for Aerospace Hydraulic Non-Rotating Equipment
APR1321	Flexure Testing of Bent Hydraulic Tubing

2.3.1 SAE Specifications: (Continued)

ARP1383	Impulse Testing of Hydraulic Actuators, Valves, Pressure Containers and Similar Fluid System Components
ARP1625	Cold Gas Systems, Missile or Projectiles Design, Installation, Tests and Requirements for
ARP1833	Sealing Techniques for Missile Application

2.3.2 National Aerospace Standards Committee Specifications:

NAS 810	Protection of Fluid Lines
NAS 1095	Flareless Fitting Connections Fabrication and Assembly
NAS 1613	Packing, O-Ring, Phosphate Ester Resistant
NAS 1629	O-Ring Elongation Modulus Test

3. DESIGN STANDARDS:

3.1 Military Standards (MIL-STD):

MIL-STD-9	Screw Thread Conventions and Methods of Specifying
MIL-STD-17	Mechanical Symbols (Part No. 1)
MIL-STD-17	Mechanical Symbols for Aeronautical; Aerospacecraft. and Spacecraft Use (Part No. 2)
MIL-STD-29	Springs, Mechanical, Drawing Requirements for
MIL-STD-100	Engineering Drawing Practices
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-130	Identification Marking of U. S. Military Property
MIL-STD-177	Rubber Products, Terms for Visible Defects of
MIL-STD-186	Protective Finishing Systems for Rockets, Guided Missiles, Support Equipment and Related Materials
MIL-STD-190	Identification Marking of Rubber Products
MIL-STD-210	Climatic Extremes for Military Equipment
MIL-STD-276	Impregnation of Porous Nonferrous Metal Castings
MIL-STD-407	Visual Inspection Guide for Rubber Molded Items
MIL-STD-413	Visual Inspection Guide for Rubber O-Rings
MIL-STD-785	Reliability Program for Systems and Equipment Development and Production
MIL-STD-810	Environmental Test Methods for Aerospace and Ground Equipment
MIL-STD-847	Preparation of Technical Reports
MIL-STD-889	Dissimilar Metals
MIL-STD-970	Standards and Specifications, Order of Preference for the Selection of
MIL-STD-1247	Marking, Functions and Hazard Designations of Hose, Pipe, and Tube Lines for Aircraft, Missile and Space Systems
MIL-STD-1306	Fluerics Terminology and Symbols
MIL-STD-1522	Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Systems

3.1.1 Specification Bulletins:

USAF Spec. Bulletin 528 Fitting, Hose, Tetrafluoroethylene, High Temperature, Medium Pressure, Classification of Defects

3.2 Military Standards (MS):

MS18084	Design Standards for Assembly of Tetrafluoroethylene Hose Fittings
MS21343	Boss, Spacing - Hydraulic, Design Standard for
MS21344	Fitting - Installation of Flared Tube, Straight Threaded Connectors, Design Standard for
MS21345	Fitting, Installation of Universal Elbow
MS21931	Fitting Installation, Cluster
MS21932	Fitting End, Bolt Cluster Fitting End, Bolt Cluster Fitting, Single Port
MS21933	Fitting End, Bolt Cluster Fitting, Single Port Through, Flareless
MS21934	Fitting End, Bolt Cluster Fitting, Double Port
MS21935	Fitting End, Bolt Cluster Fitting, Double Port, Through, Flareless
MS21936	Contour and Mounting End, Cluster Fitting Body, Semi-Finish
MS21947	Fitting End - Bolt Cluster Fitting Single Port Through
MS24385	Fitting End, Flareless Tube Connection and Gasket Seal, Precision Type, Standard Dimensions
MS33514	Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal
MS33515	Fitting End, Standard Dimensions for Bulkhead Flareless Tube Connections
MS33540	Safety Wiring and Cotter Pinning, General Practices for
MS33566	Fittings, Installation of Flareless Tube, Straight- Threaded Connectors
MS33583	Tubing End, Double Flare, Standard Dimensions for
MS33584	Tubing End, Standard Dimensions for Flared Tube
MS33611	Tube End Radii
MS33620	Chart, Hose Selection
MS33649	Bosses, Fluid Connection - Internal Straight Thread
MS33656	Fitting End, Standard Dimensions for Flared Tube Connection and Gasket Seal
MS33657	Fitting End, Standard Dimensions for Bulkhead Flared Tube Connections
MS33658	Fitting End, Hose Connection, Standard Dimensions for
MS33660	Tubing End, Hose Connection, Standard Dimensions for
MS33666	Packing, Preformed - Aeronautical, Elastomeric, Range of Sizes
MS33668	Packing, Preformed - Tube Fitting, Elastomeric, Range of Sizes
MS33675	Scraper, Installation, Packing Gland Ring
MS33786	Fitting Installation, Flared Tube and Hose, Swivel
MS33790	Bend Data, Minimum, Hydraulic, Pneumatic, Fuel and Oil Hose

3.3 Air Force/Navy Design Standards:

AND 10050	Bosses, Standard Dimensions for Gasket Seal Straight Thread
AND 10059	Fittings - Styles of Pipe Threaded, Flared Tube and Hose
AND 10067	Valve Installation - Hydraulic Bleeder, Standard Dimensions for
AND 10071	Boss and Installations - Air Connection
AND 10104	Tubing, Steel, Corrosion-Resistant, Round, Standard Dimensions for
AND 10230	Reference Chart, Aircraft Engine Accessory Drive
AND 10260	Flange - Type X Accessory Mounting
AND 10261	Flange - Type XI Accessory Mounting
AND 10262	Flange - Type XII Accessory Mounting
AND 10302	Installation Clearance-IX Drive
AND 10331	Installation Clearance-Type XII-J Drive (Fluid Power Pump)
AND 10338	Installation Clearance-Type XII-K (Fluid Power Pump)
AND 20001	Drive - Type XI Engine Accessory
AND 20002	Drive - Type XII Engine Accessory

3.4 American Standards Association Documents.

ASA-B46.1 Surface Texture

3.5 Industry Design Standards:

3.5.1 SAE Standards:

AS568	Aerospace Size Standard for O-Rings
ARP584	Coiled Tubing
AS666	Cavity Design and O-Ring Selection for Static Seal Use in Aircraft Tubeless Wire Wheels
ARP674	Metal Ring Seal Groove Design
AS756	Fitting End Assembly, Universal
AS758	Fittings-Installation in Straight Threaded Boss
AS959	Drive-Studded, Accessory, 2.653 BC Square, Design Standard for
AS960	Flange-Accessory, 2.653 BC Square, Design Standard for
AS961	Drive-Studded, Accessory, 5.000 BC Square, Design Standard for
AS962	Flange-Accessory, 5.000 BC Square, Design Standard for
AS963	Drive-Studded, Accessory, 5.000 BC Round, Design Standard for
AS964	Flange-Accessory, 5.000 BC Round, Design Standard for
AS965	Drive-Studded, Accessory, 8.000 BC Round, Design Standard for
AS966	Flange-Accessory, 8.000 BC Round, Design Standard for
AS967	Drive-Studded, Accessory, 10.000 BC Round, Design Standard for
AS968	Flange-Accessory, 10.000 BC Round, Design Standard for
AS969	Drive-Accessory, 5.000 BC Round, Design Standard for
AS970	Drive-Accessory, 8.000 BC Round, QAD, Design Standard for
AS971	Drive-Accessory, 10.000 BC Round, QAD, Design Standard for
AS972	Spline Details, Accessory Drives and Flanges
ARP994	Design of Turbine Installations for Aerospace Fluid Power Systems, Recommended Practice for

3.5.2 National Aerospace Standards Committee Standards:

NAS 550	Fitting - Installation of Universal Elbow
NAS 1638	Cleanliness Requirements of Parts used in Hydraulic Systems

3.6 Federal Standards:

FED-STD-209	Clean Room and Workstation Requirements, Controlled Environment
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4. STANDARD COMPONENTS:

4.1 Military Standard Components:

MS24333	Coupling Assembly, Hydraulic, Self-Sealing, Quick Disconnect, Flared Fitting to Internal Thread Boss
MS24334	Coupling Assembly, Hydraulic, Self-Sealing, Flareless Fitting to Internal Thread Boss
MS24335	Flange, Bulkhead Mounting, Hydraulic Self-Sealing Coupling
MS24423	Valve, Check-Hydraulic, Minus 65 Deg. F to Plus 450 Deg. F, 3000 psi, Flareless Tube
MS24478	Gage, Single 1-Inch Dial, Pneumatic Pressure
MS24593	Valve, Check-Hydraulic, Minus 65 Deg. F to Plus 450 Deg. F 3000 psi, Flared Tube
MS25275	Switch, Pressure, Engine Mounted (Type 1)
MS25276	Switch, Pressure, Bulkhead Mounted (Type 2)
MS27201	Tank, Pneumatic Pressure, Aircraft, Glass Fiber Sphere
MS28005	Transmitters, Pressure, Synchro, Aircraft
MS28016	Valve - Hydraulic Dual Thermal Expansion Relief
MS28051	Valve - Static Pressure Selector
MS28061	Gages, Pressure, Engine and Utility, 2-Inch, Flange Mounted, Back Ports
MS28063	Gages, Pressure, Engine and Utility, 2-Inch, Flange or Port Mounted, Bottom Port
MS28700	Accumulator - Cylindrical, 3000 psi
MS28720	Filter, Aircraft Hydraulic Line Type, 3000 psi
MS28764	Valve, Check, Controllable, Rotary Action, Hydraulic, 3000 psi, Type II Systems
MS28765	Valve, Check, Hydraulic, Internal Ports, 3000 psi, Type II Systems
MS28766	Valve, Shuttle, Hydraulic, Direct Mounting, 3000 psi, Type II Systems
MS28767	Valve, Shuttle, Hydraulic, Internal-Thread, Tube Fitting Outlet, 3000 psi, Type II Systems
MS28768	Valve, Check, Controllable Plunger-Type, Hydraulic, 3000 psi, Type II Systems
MS28771	Valve, Check, Hydraulic, Flared, 3000 psi, Type II Systems
MS28797	Accumulator, Hydraulic, Cylindrical, 3000 psi, Type II
MS28881	Valve - Hydraulic, Directional Control, Slide Selector 4 Way, 3000 psi
MS28886	Valve, Aircraft Hydraulic Flow Regulator
MS28887	Relief, Cylindrical, Type II Systems

4.1 Military Standard Components: (Continued)

MS28889	Valve, Air, High-Pressure Charging
MS28890	Valve, Hydraulic Check, 3000 psi, Flareless, Type II Systems
MS28891	Valve, Shuttle, Hydraulic, 3000 psi, Direct Mounting
MS28892	Valve, 3000 psi Hydraulic Check, Flareless, Type II Systems
MS28893	Valve, Hydraulic Relief, Cylindrical, Type II Systems
MS28895	Filter, Fluid, Pressure, Hydraulic Line, 3000 psi, Absolute 15 Micron, Style A, Bypass, 275 Deg. F
MS28896	Filter, Fluid, Pressure, Hydraulic Line, 3000 psi, Absolute 15 Micron, Style B, Non Bypass, 275 Deg. F
MS28897	Filter Element, Fluid, Pressure, Hydraulic Line, 3000 psi, Absolute 15 Micron, 275 Deg. F
MS29527	Valve, Fuel Shutoff Solenoid Operated, 28 Volt DC 60 psi Operating Pressure
MS87005	Valve, Vacuum Breaking

4.2 Air Force/Navy Standard Components:

AN 4149	Pump - 3 GPM at 3000 psi Power Driven Hydraulic
AN 5829	Valve - Instrument Vacuum Control
AN 5830	Valve - Low Pressure Check, Internal Pipe Threads (Use MS28050)
AN 5832	Valves - Pressure Gage Lines Bleeder and Filler Check (Use MS28050)
AN 6111	Pump - 7-1/2 CFM Engine Driven Air
AN 6201	Pump - Hydraulic Hand
AN 6204	Valve, Hydraulic Bleeder
AN 6206	Regulator - 10 GPM Hydraulic Pressure
AN 6207	Valve - 1500 psi Hydraulic Check
AN 6210	Valve - In Line Type 3-1/2 GPM Hydraulic Directional Control
AN 6211	Valve - In Line Type 6 GPM Hydraulic Directional Control
AN 6213	Valve - Radial Type 3-1/3 GPM Hydraulic Directional Control
AN 6214	Valve - Radial Type 6 GPM Hydraulic Directional Control
AN 6215	Valve - Radial Type 16 GPM Hydraulic Directional Control
AN 6234	Filter - Hydraulic Replaceable Element Line Type
AN 6235	Filter Element - Hydraulic Replaceable Micronic Line Type
AN 6236	Filter Element - Hydraulic Replaceable Micronic Reservoir Type
AN 6237	Filter Element - Hydraulic Replaceable Micronic Vent Type
AN 6238	Gasket - Hydraulic Replaceable Reservoir Type Filter Element
AN 6240	Filter - Hydraulic Replaceable Vent Type
AN 6245	Valve - Hydraulic Thermal Expansion Relief
AN 6248	Pump - Hydraulic Hand, Type 3000
AN 6249	Valve, 3000 psi Hydraulic Check
AN 6270	Hose Assembly-Detachable Swivel Fitting, Low Pressure

4.2 Air Force/Navy Standard Components: (Continued)

AN 6277	Valve - Hydraulic Shuttle, 3000 psi, Internal Thread Tube Fitting Outlet (Inactive; use MS28767)
AN 6278	Valve - Hydraulic Shuttle, 3000 psi, Universal and Internal Thread Fitting Outlet (Inactive)
AN 6280	Valve-3000 psi Hydraulic Check Internal Ports
AN 6281	Fuse - Hydraulic Quantity Measuring, Class 3000, Type 1
AN 6282	Fuse - Hydraulic Quantity Measuring, Class 3000, Type 2
AN 6293	Valve - 4 Way Rotary Selector, 3000 psi, Non-Interflow
AN 6294	Valve - 4 Way Rotary Selector, 3000 psi, Interflow
AN 6295	Regulator - 10 GPM Hydraulic Pressure

5. HYDRAULIC AND PNEUMATIC FITTINGS:5.1 Military Standard Fittings:

MS9015	Plug - Machine Threaded "O" Ring Seal (Inactive)
MS20819	Sleeve, Flared Tube Fitting
MS21900	Adapter, Flareless Tube to AN Flared Tube
MS21901	Adapter, Flareless Tube for 3/8 Bulkhead and Universal to AN Flared Tube
MS21902	Union, Flareless Tube
MS21903	Union, Flareless Tube, 3/8 Bulkhead and Universal
MS21904	Elbow, Flareless Tube, 90 Degree
MS21905	Tee, Flareless Tube
MS21906	Cross, Flareless Tube
MS21907	Elbow, Flareless Tube and Universal 45 Degree
MS21908	Elbow, Bulkhead Universal 90 Degree, 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
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
MS21925	Elbow, 90 Degree Universal, Flareless Tube, High Profile
MS21926	Elbow, 90 Degree 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 Degree, Flareless

5.1 Military Standard Fittings: (Continued)

MS21944	Body, Cluster Fitting, Two Way, 190 Degree, Flareless
MS21945	Body, Cluster Fitting, Three Way, Flareless
MS21946	Body, Cluster Fitting, One Way, Internal Boss
MS21949	Bolt - Cluster Fitting Single Port-Flare
MS21950	Bolt - Cluster Fitting Single Port Through-Flare
MS21951	Bolt - Cluster Fitting Double Port-Flare
MS21952	Bolt - Cluster Fitting Double Port Through-Flare
MS21953	Body - Cluster Fitting One Way-Flare
MS21954	Body - Cluster Fitting Two Way 90 Degree-Flare
MS21955	Body - Cluster Fitting Two Way 180 Degree-Flare
MS21956	Body - Cluster Fitting Three Way-Flare
MS21958	Body - Cluster Fitting, Two Way 180 Degree, Internal Boss
MS21959	Body - Cluster Fitting, Two Way 90 Degree, Internal Boss
MS21960	Body - Cluster Fitting, Three Way, Internal Boss
MS24387	Bolt, Fluid Passage, Precision Type
MS24388	Tee, Flared Tube, Internal Thread on Side, Precision Type
MS24389	Tee, Flared Tube, Internal Thread on Run, Precision Type
MS24390	Tee, Flared Tube, with Bulkhead on Run, Precision Type
MS24391	Plug-Bleeder, Bleeder, Tube, Precision Type
MS24392	Union, Flared Tube, Precision Type
MS24393	Union, Flared Tube 3/8 Bulkhead and Universal, Precision Type
MS24394	Elbow, Flared Tube Bulkhead and Universal, 90 Degree, Precision Type
MS24395	Tee, Bulkhead and Universal Flared Tube, Precision Type
MS24396	Elbow, Flared Tube and Universal 45 Degree, Precision Type
MS24397	Bushing, Screw Thread Reducer, Precision Type
MS24398	Bushing, Screw Thread Expander, Precision Type
MS24399	Reducer, External Thread Flared Tube, Precision Type
MS24401	Elbow, Flared Tube, 90 Degree, Precision Type
MS24402	Tee, Flared Tube, Precision Type
MS24403	Cross, Flared Tube, Precision Type
MS24404	Plug, Flared Tube, Precision Type
MS24405	Adapter, Flareless Tube to AN Flared Tube, Precision Type
MS24487	Nipple, Tube, 37 Degree to 45 Degree Seat
MS24651	Elbow, Tube - 90 Degree, Bulkhead, Flareless Tube Universal to Flared Tube
MS24652	Elbow, Tube - 90 Degree, Bulkhead, Flared Tube Universal to Flareless Tube
MS24654	Elbow, Tube - 45 Degree, Bulkhead, Flareless Tube Universal to Flared Tube

5.2 Air Force/Navy Standard Fittings:

AN 774	Bolt - Flared Tube-Fitting End Universal
AN 775	Bolt - Universal Fitting
AN 776	Elbow - Universal 90 Degree
AN 777	Elbow - Universal 75 Degree
AN 778	Elbow - Universal 45 Degree
AN 779	Tee - Universal Fitting
AN 783	Tee, Flared Tube, Internal Thread on Side
AN 784	Tee, Flared Tube, Internal Thread on Run

5.2 Air Force/Navy Standard Fittings: (Continued)

AN 804	Tee, Flared with Bulkhead on Run
AN 806	Plug - Flared Tube
AN 809	Core - High Pressure Air Valve
AN 814	Plug and Bleeder-Flared Tube
AN 815	Union- Flared Tube
AN 817	Nut - Sleeve, Coupling
AN 818	Nut - Coupling
AN 821	Elbow - Flared Tube, 90 Degree
AN 824	Tee - Flared Tube
AN 827	Cross - Flared Tube
AN 832	Union - Flared Tube 3/8 Bulkhead and Universal
AN 833	Elbow-Flared Tube and Bulkhead Universal 90 Degree
AN 834	Tee - Bulkhead and Universal Flared Tube
AN 837	Elbow- Flared Tube and Universal, 45 Degree
AN 871	Flange - Straight Thread Boss Welding
AN 893	Bushing - Screw Thread Reducer
AN 894	Bushing - Screw Thread Expander
AN 919	Reducer - External Thread Flared Tube
AN 924	Nut - Flared Tube Bulkhead and Universal Fitting
AN 929	Cap Assembly, Pressure Seal Flared Tube Fitting
AN 937	Cross - Internal Screw Thread
AN 938	Tee - Internal Screw Thread
AN 939	Elbow - Internal Screw Thread, 90 Degree
AN 941	Elbow - Internal Screw Thread, 45 Degree
AN 6289	Nut - Flared Tube Universal Fitting

5.3 Industry Standard Fittings:5.3.1 SAE Standards:

ARP908	Hose and Tube Fitting-Installation and Qualification Test Torque Requirements
AS1001	Tee, Reducer, Bulkhead on Run, Internal Port on Side, Flareless Tube
AS1002	Tee, Reducer, Bulkhead and Internal Port on Run, Flareless Tube
AS1003	Tee, Reducer, Bulkhead on Run, Flareless Tube
AS1004	Elbow, 90°, Reducer, Flareless Tube
AS1005	Tee, Reducer, Flareless Tube
AS1006	Cross, Reducer, Flareless Tube
AS1007	Union, Reducer, Bulkhead, Flareless Tube
AS1008	Elbow, 90°, Reducer, Bulkhead, Flareless Tube
AS1009	Tee, Reducer, Bulkhead on Side, Flareless Tube
AS1010	Elbow, 45°, Reducer, Flareless Tube
AS1011	Fitting End, Attachable, Male for 37° Flared Tube Connection, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles
AS1012	Fitting End: Attachable, Swivel Female 37° Machined Flare, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles

5.3.1 SAE Standards: (Continued)

AS1013	Fitting End, Attachable, Swivel Female 37° Flared Tube, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles
AS1014	Fitting End, Attachable, Swivel Flange, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles
AS1015	Fitting End, Attachable, Female Flareless, Machined Nipple, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles
AS1016	Fitting End, Attachable, Flareless Male, Flexible Metal Hose - Straight, 45° Elbow and 90° Elbow Styles
AS1031	Reducer Tee - Bulkhead on Run, Internally Threaded Side Port, Flared Tube
AS1032	Tee, Reducer - Bulkhead and Internally Threaded Port on Run, Flared Tube
AS1033	Reducer Tee - Bulkhead on Run, Flared Tube
AS1034	Elbow, 90° Reducer, Flared Tube
AS1035	Tee, Reducer, Flared Tube
AS1036	Cross, Reducer Flared Tube
AS1037	Union, Reducer, Bulkhead, Flared Tube
AS1038	Elbow, 90° Reducer, Bulkhead, Flared Tube
AS1039	Tee, Reducer, Bulkhead on Side, Flared Tube
AS1040	Elbow, 45° Reducer, Flared Tube
AS1043	Lockwire Hole, Standard Dimension
AS1073	Sleeve, Hose Assembly, Heat Shrinkable
AS1241	Fire Resistant Hydraulic Fluid
AS1290	Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems
AS1297	Reducers, Pneumatic Pressure, Missile

5.3.2 National Aerospace Standards Committee Standards:

NAS 424	Coupling - Fittings Internal Screw Thread
NAS 551	Bolt - Universal Fitting
NAS 552	Elbow - Universal 90 Degree
NAS 553	Elbow - Universal 15 Degree
NAS 554	Elbow - Universal 45 Degree
NAS 555	Tee - Universal
NAS 1236	Bolt - Universal, Tube Eng - Flareless (Inactive)
NAS 1237	Elbow - Universal 90 Degree - Flareless
NAS 1238	Elbow - Universal 75 Degree - Flareless (Inactive)
NAS 1239	Elbow - Universal 45 Degree - Flareless (Inactive)
NAS 1240	Tee - Universal - Flareless
NAS 1367	Fittings, Coated Lubricant and Sealant

6. UTILITY PARTS AND HARDWARE STANDARDS:6.1 Military Standard Parts:

MS9058	Ring - Back-Up, Boss Connection, AMS 3651
MS18085	Fitting End - Tetrafluoroethylene Hose Medium Pressure, Swivel Nut, Corrosion Resistant Steel

6.1 Military Standard Parts: (Continued)

MS18086	Fitting End - Tetrafluoroethylene Hose Medium Pressure, 45 Degree Swivel Nut, Corrosion Resistant Steel
MS18087	Fitting End - Tetrafluoroethylene Hose Medium Pressure, 90 Degree Swivel Nut, Corrosion Resistant Steel
MS18088	Fitting End - Tetrafluoroethylene Hose Medium Pressure, Swivel Flange, Corrosion Resistant Steel
MS18089	Fitting End - Tetrafluoroethylene Hose Medium Pressure, 45 Degree Swivel Flange, Corrosion Resistant Steel
MS18090	Fitting End - Tetrafluoroethylene Hose Medium Pressure, 90 Degree Swivel Flange, Corrosion Resistant Steel
MS20756	Flange, Swivel, Retaining
MS20757	Connector, Fixed Flange, to Hose
MS20760	Connector, Fixed Flange, to Flared Tube
MS20813	Cap, High-Pressure Air Valve
MS20995	Wire, Lock
MS21919	Clamp, Cushioned, Support, Loop-Type, Aircraft
MS24587	Adapter, Straight, Tube to Hose-Reusable, Hydraulic, Pneumatic, Fuel and Oil Lines
MS24588	Nipple, Adapter, Hose to Tube, Reusable, Hydraulic, Pneumatic, Fuel and Oil Lines 3/16 through 3/4 inch Tubing Size
MS24589	Nipple, Adapter, Hose to Tube, Reusable, Hydraulic, Pneumatic, Fuel and Oil Lines 1 through 2 Inch Tubing Size
MS24590	Socket, Adapter, Hose to Tube, Reusable, Hydraulic, Pneumatic, Fuel and Oil Lines 3/16 through 3/4 Inch Tubing Size
MS24591	Socket, Adapter, Hose to Tube, Reusable, Hydraulic, Pneumatic, Fuel and Oil Lines 1 through 2 Inch Tubing Size
MS24690	Packing, Preformed - High Pressure Air Valve
MS27053	Adapter Assembly, Flared, Straight, Tube to Hose - With Swivel Nut
MS27054	Adapter Assembly, Straight, Swivel Flange to Hose
MS27055	Adapter Assembly, Flared, 45 Degree Elbow, Tube to Hose - With Swivel Nut
MS27056	Adapter Assembly, 45 Degree Elbow, Swivel Flange to Hose
MS27057	Adapter Assembly, Flared, 90 Degree Elbow, Tube to Hose - With Swivel Nut
MS27058	Adapter Assembly, 90 Degree Elbow, Swivel Flange to Hose
MS27059	Adapter Assembly, Flared, 45 Degree Forged Elbow, Tube to Hose - With Swivel Nut
MS27060	Adapter Assembly, Flared, 90 Degree Forged Elbow, Tube to Hose - With Swivel Nut
MS27061	Nipple Sub Assembly, Flared, Straight - With Swivel Nut
MS27062	Nipple Sub Assembly, Straight, Swivel Flange
MS27063	Elbow Sub Assembly, Flared, 45 Degree, Swivel Nut
MS27064	Elbow Sub Assembly, Swivel Flange, 45 Degree
MS27065	Elbow Sub Assembly, Flared, 90 Degree, Swivel Nut