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AEROSPACE INFORMATION REPORT

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Submitted for recognition as an American National Standard

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

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 Assmby, Flared, 45 Degree, Swivel Nut |
| MS27064 | Elbow Sub Assembly, Swivel Flange, 45 Degree |
| MS27065 | Elbow Sub Assembly, Flared, 90 Degree, Swivel Nut |