Pipes and Unions

Aircraft fluid lines are made from:

Metal Tubing: for Stationary application such as fuel, oil, oxygen and hydraulic lines.

Flexible Hose: For moving parts or areas with considerable vibration.

RIGID FLUID LINES

Tubing Material:

1, Copper – Older aircraft

2, Aluminum Alloy – General purpose lines with negligible pressure (500 psi). E.g. Instrument lines

3, Steel – High pressure hydraulic systems (3000psi or more).

4, Titanium – For high performance aircraft. For pressure above 1500 psi. DO NOT USE WITH OXYGEN SYSTEMS.

Material Identification

1, Important to identify material before any repair on any aircraft tubing.

2, Aluminum alloy, steel, or titanium tubing can be identified readily by sight where it is used as the basic tubing material.

3, Compare code markings of the replacement tubing with the original markings on the tubing being replaced.

4, On small aluminum tubing, designation is stamped on the surface

Fluid Line End Fittings

1, Depending on the type and use, fittings will have either pipe threads or machine threads.

2, Pipe threads are similar to those used in ordinary plumbing and are tapered, both internal and external.

3, External threads are referred to as male threads and internal threads are female threads.

4, Some form of pipe thread lubricant approved for the particular fluid application should be used when joining pipe threads to prevent seizing and high-pressure leakage.

5, be careful when applying thread lubricant so that the lubricant will not enter and contaminate the system. **Do not use lubricants on oxygen lines.**

flared tube fitting.

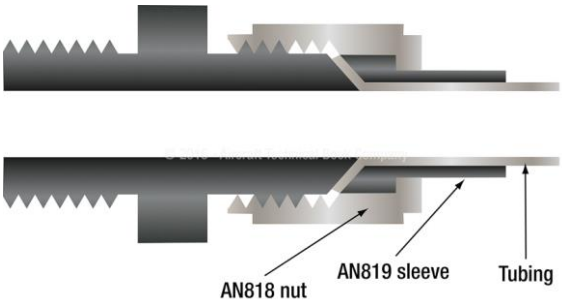
1, A flared tube fitting consists of a sleeve and a nut.

2, (1) The nut fits over the sleeve and, when tightened, (2) draws the sleeve and tubing flare tightly against a male fitting to form a seal.

3, Tubing used with this type of fitting must be flared before installation

4, The male fitting has a cone-shaped surface with the same angle as the inside of the flare

5, The sleeve supports the tube so that vibration does not concentrate at the edge of the flare and distributes the shearing action over a wider area for added strength.



AN Flared Fittings

1, Standard AN fittings are identified by their black or blue color.

2, All AN steel fittings are colored black,

AN Aluminum fittings are colored blue

AN aluminum bronze fitting are cadmium plated and natural in appearance.

Flareless Fittings

1, Flareless fittings are designed primarily for high pressure (3 000 psi) hydraulic systems that may be subjected to severe vibration or fluctuating pressure.

2, Using this type of fitting eliminates all tube flaring, yet provides a safe and strong, dependable tube connection.

Flareless Fittings

1, The fitting consists of three parts: **a body, a sleeve, and a nut.**

2, The internal design of the body causes the sleeve to cut into the outside of the tube when the body and nut are joined.

3, Although the use of flareless tube fittings eliminates all tube flaring, another operation, referred to as presetting, is necessary prior to installation of a new flareless tube assembly.

4, Flareless tube assemblies should be preset with the proper size presetting tool or operation.

Swaged Fittings

1, A popular repair system for connecting and repairing hydraulic lines on transport category aircraft is the use of Perm swage fittings.

2, Swaged fittings create a permanent connection that is virtually maintenance free.

3, Swaged fittings are used to join hydraulic lines in areas where routine disconnections are not required and are often used with titanium and corrosion resistant steel tubing

4, The fittings are installed with portable hydraulically powered tooling, which is compact enough to be used in tight spaces

Swaged Fittings

1, Permalite is a tube fitting that is mechanically attached to the tube by axial swaging

2, The movement of the ring along the fitting body results in deformation of the tube with a leak-tight joint.

Cyrofit Fittings

1, Many transports category aircraft use Cryofit fittings to join hydraulic lines in areas where routine disconnections are not required

2, CryofitTM fittings are standard fittings with a cryogenic sleeve.

3, The sleeve is made of a shape memory alloy, Tinel.

4, The sleeve is manufactured 3 percent smaller, frozen in liquid nitrogen, and expanded to 5 percent larger than the line.

Flexible Hoses

1, Flexible hose is used in aircraft fluid systems to connect moving parts with stationary parts in locations subject to vibration or where a great amount of flexibility is needed.

2, It can also serve as a connector in metal tubing systems

3, Pure rubber is never used in the construction of flexible fluid lines. To meet the requirements of strength, durability, and workability, among other factors, synthetics are used in place of pure rubber.

4, Synthetic materials most commonly used in the manufacture of flexible hose are Buna-N, Neoprene, Butyl, Ethylene Propylene Diene Rubber (EPDM) and Teflon.

Hose Fittings

1, Flexible hose may be equipped with either swaged fittings or detachable fittings, or they may be used with beads and hose clamps

2, Hoses equipped with swaged fittings are ordered by correct length from the manufacturer and ordinarily cannot be assembled by the mechanic.

3, They are swaged and tested at the factory and are equipped with standard fittings.

4, The detachable fittings used on flexible hoses may be detached and reused if they are not damaged; otherwise, new fittings must be used

Low, Medium and High Pressure Hoses

Low pressure — below 250 psi. Fabric braid reinforcement.

Medium pressure — up to 3 000 psi. One wire braid reinforcement. Smaller sizes carry up to 3 000 psi. Larger sizes carry pressure up to 1500 psi.

High pressure — all sizes up to 3 000 psi operating pressures.

Fluid Line Identification

Once a pipe has been fitted to the aircraft, it should have system identification label attached to enable engineers to identify which system each pipe belongs to. The label comes in rolls of about 25 mm wide and uses colors, symbols and letters to differentiate between different pipes.