



# **Fitting Solutions**

## **DRY TECHNOLOGY**

Fitting Solutions Series – No. 11

### **AN FITTINGS**

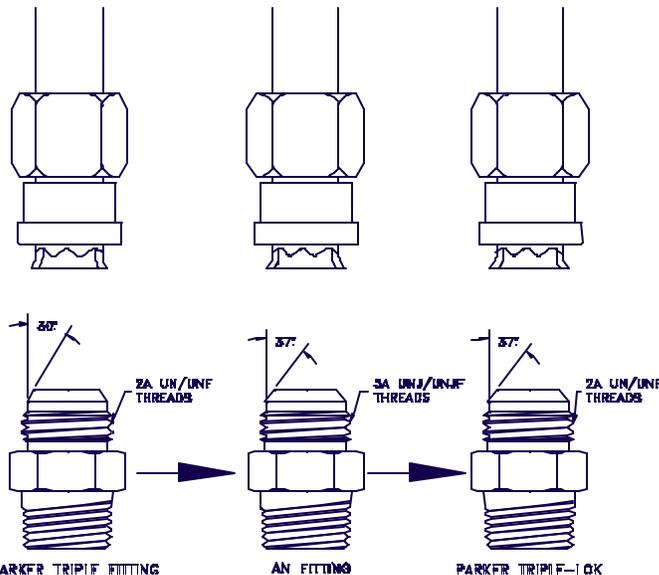
The Tube Fittings Division receives numerous inquiries regarding "AN" fittings. AN (Air Force - Navy Aeronautical Standard) and AND (Air Force - Navy Aeronautical Design Standard) are standards used by the U.S. Military in aviation applications. AN fittings are manufactured to meet above standards. These fittings include the 37° flare, flareless, hose connections, "banjo" type fittings, specialized flange fittings, pipe fittings and other types of connections. This bulletin has been developed to answer frequently asked questions about the 37° flare AN fittings and how they relate to their industrial counterpart, the SAE (Society of Automotive Engineers) 37° flare (Triple-Lok) fittings.

#### **History**

Parker pioneered the flare fitting technology in the 1920's with the introduction of the inverted flare fitting followed by the Parker Triple Fitting in early 1930's. They were adopted by Air Corps (a part of the U.S. Army at that time) as AC-810 and AC-811. As the operating pressures increased, inverted flare did not perform as well as Triple Fitting, and its use started declining. The ease of manufacture of Triple Fitting provided additional advantage that resulted in quick acceptance of it in various industrial and military applications.

The Triple Fitting was a patented three-piece design similar to current Triple-Lok, except it had 30° flare angle instead of the 37°. This fitting design was the forerunner of the current AN and SAE 37° flare fittings.

Parker Hannifin Corporation – Tube Fittings Division



#### **Evolution of the Flared Fitting**

The U.S. Air Force, with help from Wright Patterson Air Force base, developed a fitting with 37° flare angle, before WWII, which became known as the "AN" fitting. This fitting had precision 3A/3B threads. The use of "AN" fittings proliferated from the 1930's through the 1960's to include most branches of U.S. Military, Military Contractors, General Aviation and Commercial Aviation. These fittings were even adopted for use in many land/sea applications of the U.S. Military as well, leading to confusion between AN and its industrial counterpart, the SAE 37° fitting.

After the war, several versions of 37° flare fittings flooded the industrial market, creating a nightmare for the users. The Joint Industry Conference (JIC), an organization of manufacturers, decided to standardize on the "AN" design, except with 2A/2B thread class for ease in manufacturing. These fittings came to be known, throughout the world, as "JIC" fittings. The JIC wanted the prestige of SAE for the fitting standard. They convinced SAE to take on the task and helped in the development of the standard. Thus, the SAE standard 37° flare fitting became part of SAE J514 in 1950. The fitting became an ISO standard, ISO 8434, in 1986, replaced by ISO 8434-2 in 1996.

**AN Fittings Today**

AN fittings remain prevalent today. However, the U.S. Military is canceling many of the true AN/AND standards and replacing them with AS (Aerospace Standards) standards developed, again, by SAE. Many aircraft/aerospace applications are moving towards aluminum and titanium for optimized weight-to-strength parameters.

**Differences Between AN Flare & 37° Industrial Flare**

There are several differences between "comparable" industrial 37° flare (SAE/ISO) and AN style fittings. Some include:

<b><u>Threads:</u></b>	AN37° Flare: SAE/ISO: Reason:	Male & Female, Class 3A/3B UNJ/UNJF (radiused root threads) Male & Female, Class 2A/2B, UN/UNF Series threads. Tighter tolerances and better fatigue life for aircraft, aerospace, military applications.
<b><u>Military Conformance</u></b>		
<b><u>Standards:</u></b>	AN Flare: SAE:	AN flare fittings conform to MIL-F-5509 specifications Some 37° flare fittings conform to MIL-F-18866 as shown on MS51500 through MS5134
<b><u>Industrial Conformance</u></b>		
<b><u>Standards:</u></b>	AN Flare: SAE/ISO:	Meet SAE Aerospace (AS) standards. Meet the applicable dimensional & performance requirements of SAE J514/ISO 8434-2

<b><u>Materials:</u></b>	AN Flare: SAE/ISO:	Available commonly in, carbon steel, stainless steel (CRES), aluminum, titanium and copper/nickel Available in commonly carbon steel, stainless steel, and brass
<b><u>General:</u></b>		In addition to the above noted differences, drop lengths, hex sizes, hex widths may also vary between "comparable" AN flare and 37° industrial flare products

in some sizes.

**Interchangeability:** AN flare and 37° industrial flare function identically. In many cases they **appear** to be functionally interchangeable, **but they are not**. What this means is that while the products may look similar, one must **not** offer a Parker Triple-Lok fitting (or any other industrial 37° flare design) as a direct substitution.

For cost and availability reasons. 37° Parker Triple-Lok fittings may be offered as alternatives to AN/AND flare fittings only if:

- 1.) Customer approves substitution **and**
- 2.) Triple-Lok fittings are used for **ground support/land/sea** applications only.

**Note: Parker Triple-Lok (or other TFD products) fittings are not for use in Aerospace, General Aviation, Commercial Aviation or Military Aviation applications. When in doubt, contact Parker Tube Fittings Division.**

If a customer requires products manufactured to AN/AND specifications, TFD recommends calling Parker Hannifin Corporation Stratoflex Aerospace/Military Division in Fort Worth, Texas at (817) 738-6543.

TFD sincerely appreciates the opportunity to better explain the often-misunderstood world of AN Fittings. Look for another upcoming *Fittings Solutions* soon.