Data Sheet

Triple - Lok Hydraulic Tube Fittings

Introduction - Parker Triple -Lok

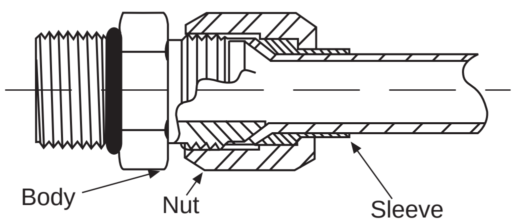
Pioneered by Parker Hannifin, Triple-Lok 37 degree flared fittings were originally designed for the hydraulic systems of agricultural and earthmoving equipment, automotive lines and machine tools. With its simplicity, compact design, ease of assembly and with worldwide availability and acceptance. Parker Triple-Lok is used in virtually every application that uses fluid power for motion control. Manufactured from steel, Parker Triple-Lok is ideally suited for low and medium pressure applications up to 350 bar nominal pressure (P_N). With its wide range of sizes and configurations and its ability to accept metric and imperial tubing just by changing the sleeve, Parker Triple-lok has become accepted worldwide.

Parker Triple-Lok principle

The Triple-Lok design is very simple. It uses an easily-produced flare at the tube end to create a seal and holds fluid under pressure in the system. The tube end is flared to 37 degrees and clamped between the fitting nose and the sleeve when the nut is tightened. This provides an effective single seal point between the fitting nose and the tube flare. The Parker Triple-Lok fitting consists of three components:

- Fitting body
- Tube nut
- Sleeve

Figure 1



The Parker Triple-Lok body

All shaped fittings are made from forgings, eliminating the potential leak paths of multi component fittings such as brazed shapes. The forged shapes have a harder steel for higher pressure (up to 350 bar) capability and to reduce the risk of nose collapse during repeated assembly.

Triple-Lok sleeve

Triple-Lok sleeves are cold-formed and heat-treated for optimum strength and ductility. Cold forming also eliminates the problem of laps, folds, stringers etc. associated with sleeves machined from barstock.

The Triple-Lok sleeve serves several important functions:

- It provides a clamping surface for the tube flare and a bearing surface for the nut, this minimises tube twist during assembly.
- It provides support to the flare, during assembly the tapered fitting nose of the body tends to expand the flared tube. The Triple-Lok sleeve helps to resist this expansion allowing the fitting to be tightened adequately.
- The large area of the sleeve in contact with the tube acts as a tube support and improves the vibration resistance of the assembly.

Triple-Lok nut

Triple-Lok nuts are cold formed (small sizes) and forged (larger sizes). This increases material strength and fatigue properties giving greater strength and a longer service life.

The Parker Triple-Lok standards and approvals

Standards

SAE J514
ISO8434-2
BS43687 Part 4
ASTM B31.1
Military specification MIL-F-18866
US NFPA T3.8.3

Triple-Lok fitting:

Materials and construction

- Triple-Lok fittings are produced from forged shapes (elbows, tees, crosses)
- Straight pieces are machined from bar stock
- Sleeves & nuts are either cold-formed or hot forged

Temperature rating

Permissible operating temperature range for steel fitting, -40°C to +120°C (DIN 3859)

Pressure ratings

Maximum working pressure (MWP)

The MWP is a figure relating to the pressure rating of a hydraulic component for continuous dynamic applications. It is rounded to correspond to internationally standardised ratings. Logical series of fittings are grouped together, with the nominal pressure of the group being that of the “lowest common denominator” within the group. Internationally, these nominal pressures are recognised and serve to match common sizes of components together. Parts with a stated MWP value are able to withstand normal, non-continuous pressure peaks. Static test burst pressures are at least 4 times the MWP value. To prove the long term dynamic load resistance, components are tested under impulse conditions of MWP x 1.33, at 1 Hz for 1 million cycles.

Tube end preparation

When preparing a tube to be assembled to a Parker Triple Lok fitting, it is essential to respect the 4 following steps:

1 Choice of tubing
2 Correct tube cutting
3 Internal and external deburring
4 Flaring the tube

1. Tube material specification

The choice of the tube to be bent/flared is important. Whatever material is selected, the tube should conform to one of the following standards:

Steel tube

Parker recommends the use of cold drawn seamless tubes or welded and redrawn tubing. They should conform to one of the following standards:

Cold drawn

NF A 49330 ______________________________rev. Sept. 85
ISO 3304 R ____________________________rev. 15 Nov 85
DIN 2391/C part1 _________________________rev. July 81
BS 3602, 1978 part 1______________________rev. March 88
SAE J524 ________________________________rev. June 91

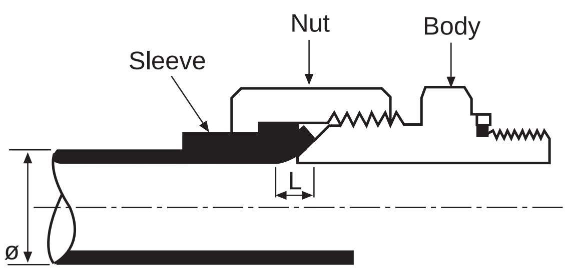
2. Tube cutting

How to calculate cut length of tube

a) As shown on the drawing, add as per length L to allow entry of nose into flare.

b) Each flare shortens the length of the tube by 0.5 to 1 mm depending on the tube thickness.

Figure 2

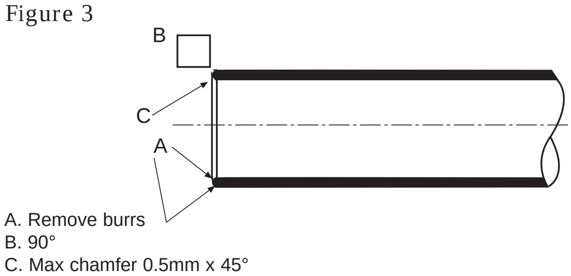


Tube O.D. mm	Thickness mm	L mm
6	1.5	2.5
8	1.5	2.5
10	2.0	2.5
12	2.0	3.0
15	1.5	3.0
16	2.0	3.0
18	2.0	3.5
20	2.5	3.5
22	3.0	3.5
25	2.5	3.5

3. Internal and external deburring

Cut the tube to required length and file the ends square. Lightly de-burr the inside and outside edges, taking care to remove all swarf.

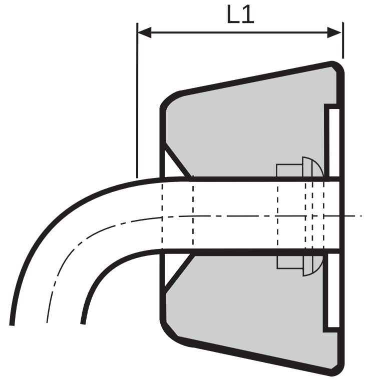
Figure 3



4. Flaring the tube end

To produce the flare, a minimum straight length before the start of the bend is necessary. Minimum straight length to start of bend.

Figure 4



Tube O.D (mm)	L1 (mm)
6	32
8	35
10	37
12	43
15	45
16	45
18	50
20	50
25	58

Selection of the equipment

Manual flaring tool vice block and flaring pin

These tools are used in a vice. They are designed for flaring metric tubing from 6mm O.D. to 25mm O.D.

From 20mm size tubing and above it is necessary to use a pre-flaring pin to start the flare.

- Clamp tubing flush in block halves
- Flare tubing by hammering the flaring pin

A separate block and pin set is used for each tube size.

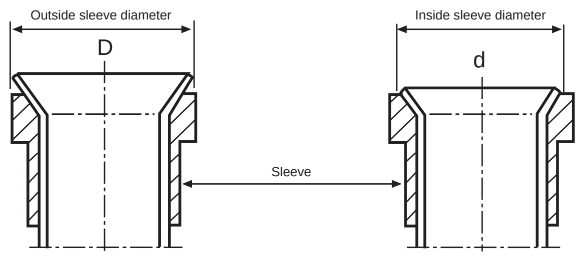
Tube O.D. inch	Pre-flaring pin part number	Flaring pin part number	Vice block part number
6		302-8411	302-8461
8		302-8411	302-8477
10		302-8411	302-8483
12		302-8427	302-8499
15		302-8427	302-8506
16		302-8427	302-8528
18		302-8433	302-8534
20	304-7816	302-8433	302-8540
25	304-7816	302-8449	302-8556

Checking the flared diameter

The flared surface should be smooth (no cracks, no chatter) and the flared diameter should conform to the following dimensions.

Tube O.D. (mm)	d (min.) (mm)	D (max.) (mm)
6	8	9.7
8	9.5	10.3
10	11.2	12.7
12	14.9	17.3
15	17.9	20.2
16	17.9	20.2
18	22.3	24.7
25	28.7	31.0

Figure 5



Properly made flares will assure long trouble-free service even under continuous critical operating conditions. Diameter of maximum flare is equal to outside diameter of sleeve. Diameter of minimum flare is equal to maximum inside diameter of sleeve end. On tubes flared too short, full clamping area of fitting cannot be utilised and flare may be thinned due to the small area of tube that is clamped. Such joints do not offer maximum security against leakage, breaking at the flare or tear-out stresses. Tubes flared too long may stick and jam on threads of nut when assembling the fitting.

Tube end preparation

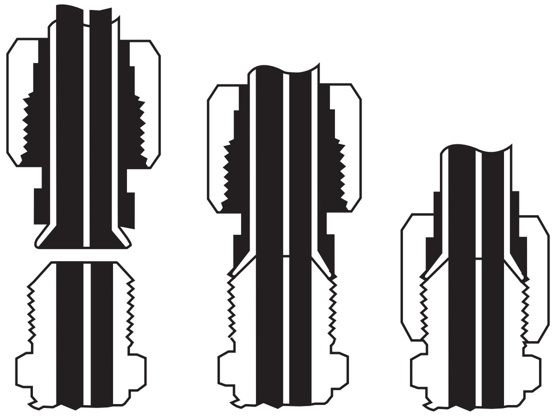
Troubleshooting guide

Problem	Problem cause	Solution
Tube slips in die during flanging or flaring	Tube undersized Die grip surface dirty Die grip surface worn	Use tube within tolerance Clean with solvent (do not use any wire brush) Replace die
Flange/flare diameter too small	Tube slipped in die The flaring pin not correct (not for 74°) Tube was not inserted to tube stop	See problem “Tube sips in die...” Use proper cone Check the 74° angle Insert tube to tube stop
Flange/flare diameter too large	Tube forced against tube stop The hydraulic flaring pressure is too high	Do not force tube against tube stop Set the proper flaring pressure (1020) Reset the flaring pressure as mentioned (1015)
Flange/flare out of round	Tube not cut squarely Tube not supported properly Obstruction in die holder Tube wall thickness varies The flaring pin is not correct/is worn out	Cut tube squarely, within ± 1° Support tube in line with dies Clean and remove debris Use good quality tube Use the proper pin/replace the pin
Cracked flange/flare	Poor tube quality Too hard tube Heavy chatter during deburring	Use recommended quality tube Use recommended quality tube Eliminate chatter in deburring
Scored, pitted flange/ flare surface	Improper/lack of lubrication on pin Tube not properly deburred Tube not properly cleaned Pin not cleaned	Use recommended lubricant Deburr and remove filings Clean to remove filings Keep pin clean but lubricated

Tube side assembly torques

- Clamp tube flare between sleeve and nose of fitting body by screwing nut on finger tight.
- Tighten with wrench for dependable metal-to-metal joint (see assembly torque table under).
- Triple-Lok fitting is easy to dis-assemble and may be reassembled repeatedly, always giving leakproof and dependable connection

Figure 6



Metric tube mm	JIC SAE Thread	Assembly torque Nm	lbs.in	FFFT method TT	ET
6	9/16-18	15± 1	140± 10	2	2
8	11/16-16	20± 1	180 ± 15	2	2
10	11/16-16	28± 2	250± 15	1.1/2	1.1/4
12	13/16-16	62± 2	550± 25	1.1/2	1
15	1-14	80± 5	700± 50	1.1/2	1
16	1-14	80± 5	700± 50	1.1/2	1
18	1.3/16-12	110± 5	1000± 50	1.1/4	1
20	1.3/16-12	110± 5	1000± 50	1.1/4	1
25	1.7/16-12	160± 5	1450± 50	1	1

TT: Tube - Tube

ET: Swivel nut or hose connection

Flats from finger tight (FFFT) method

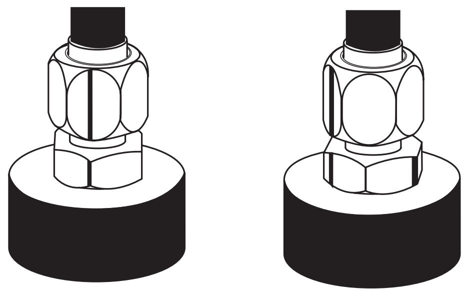
After hand tightening the joint, make a longitudinal mark on one of the flats of hex and continue it on the body hex with a permanent type ink marker as shown. Then tighten the joint further by the number of flats as shown in table (FFFT). Now mark the body hex opposite the displaced mark. These marks serve two important functions:

1. Displaced marks serve as a quick quality assurance check that the joint has been properly tightened.
2. Second mark on the body serves as a proper tightening position after a joint has been loosened.

This method is slower than the torque method - but it has three distinct advantages over the torque method:

1. It eliminates the problems associated with different plating combinations.
2. It provides a very quick visual check for proper joint tightening.
3. It does not require special tools (torque wrench crow foot spanner socket).

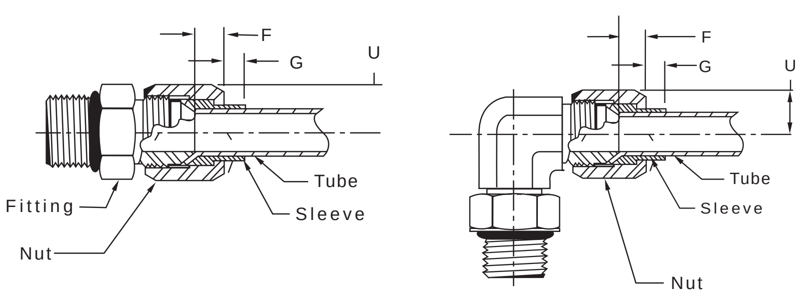
Figure 7



Notes:
1. Assembly torques shown in chart are for non-lubricated carbon steel components.
2. For stainless steel/brass fittings, contact Parker for the recommended assembly torques.
3. Recommended assembly torques are for connections consisting of all Parker manufactured fittings

Dimensions of assembled fittings

Figure 8



Tube OD mm	F	G	U
6	4.8	4.3	8.4
8	7.6	2.8	9.1
10	7.1	4.8	10.2
12	7.9	4.8	12.9
15	9.6	6.8	14.7
16	9.6	6.8	14.7
18	9.1	6.4	18.3
20	9.1	6.4	18.3
25	8.6	10.4	22.1