

## TECHNICAL SECTION

### ORDERING PARTS AND ASSEMBLIES

All components in the FLEXOLITE catalogue can be supplied individually (for self-assembly), or in ready-made assemblies – to customers' specifications, or to standard specifications (where these are available).

When ordering components please use the full part number, which consists of three elements: the generic, the specific and the material:

#### Example 1: N000-06/40D

- generic – N000 = straight female fitting for N-Type hose
- specific – 06/40 = -06 hose, /40 = M12 x 1.50 thread
- material – D = anodized aluminium

#### Example 2: X105/51/33CH

- generic – X105 = BSP male to metric concave male adaptor
- specific – /51/33 – /51 = 1/8 x 18 tpi, /33 = M8 x 1.00
- material – CH = chromium-plated

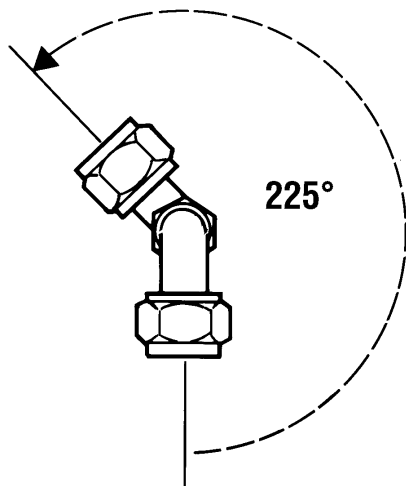
(The full list of specific codes is given below.)

When ordering ready-made assemblies the above details should be given for each fitting, as well as the length of the assembly, and the angular alignment of the fittings (where applicable).

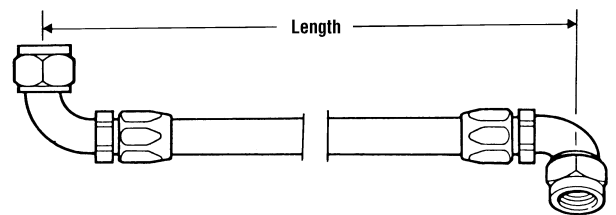
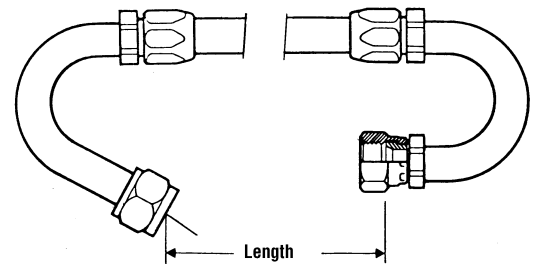
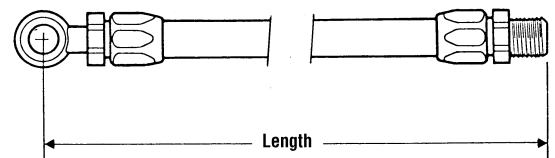
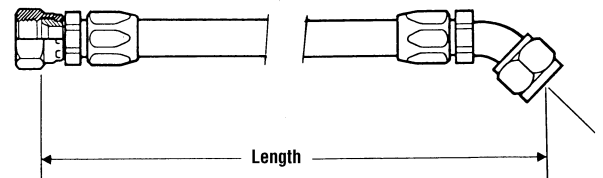
#### Example:

- S90T-04C = 90° swept tube female in stainless steel
- 0.500M x S4 = 500mm of -04 smoothbore Teflon hose
- S90T-04C = 90° swept tube female in stainless steel
- 225° = aligned at 225°

The correct alignment of angled fittings and banjoes is crucial. Fittings which are misaligned will make it impossible for the assembly to be connected, or put such a strain on the hose that it may fail in service. Alignment is calculated by holding the assembly horizontal, with the first fitting in front of the face and angled downwards, and then calculating the number of degrees of anti-clockwise rotation for the second fitting.



The length of an assembly is calculated from the centre-line of the sealing faces of the fittings – examples below:



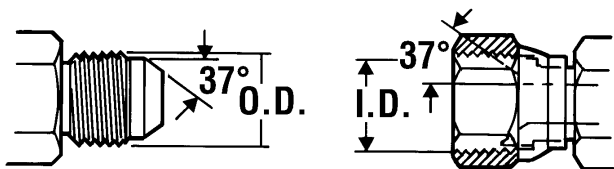
## THREADS

The non-standardisation of thread types and fittings used on cars, bikes, boats, etc can make life difficult when it comes to modifying them for competition use. (Purpose-built racers are usually a little better, but not always). The information given below will help to identify most thread sizes and types found in common usage.

Uncommon and antique threadforms may be difficult to identify, but if you have any queries FLEXOLITE's Technical Department will be happy to provide advice and assistance.

### JIC/SAE 37°/UNF STRAIGHT

These three threadforms share the same dimensions and thread pitches in all sizes. The only effective difference is that JIC (also known as SAE 37°) has a conical seating face (37° or 74° total angle) and UNF straight has a flat seat – sealing being effected by use of a washer. Male JIC fittings have a convex cone, female fittings a concave cone. JIC (also called AN from its American Army/Navy usage) is the most widely-used thread type in competition or high performance plumbing. Most hose ends are made to this specification. (There is, also, an SAE45° threadform which has a 45° conical seat. It shares the same dimensions as JIC except for the angle of its seat and in its 1-1/16 size when it has 14t.p.i. It is rare outside refrigeration and air conditioning plant and its use should be avoided as any seal it may produce with a JIC fitting cannot be guaranteed).

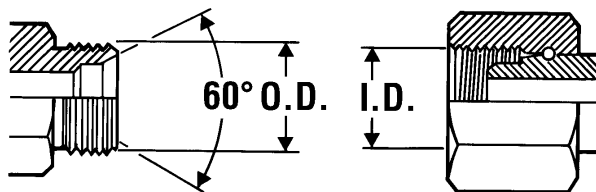


JIC THREAD DASH SIZE	THREAD SIZE	MALE THREAD O.D. (INS)	FEMALE THREAD I.D. (INS)
-02	5/16 x 24	0.3125	0.2614
-03	3/8 x 24	0.3750	0.3299
-04	7/16 x 20	0.4375	0.3762
-05	1/2 x 20	0.5000	0.4387
-06	9/16 x 18	0.5625	0.4943
-08	3/4 x 16	0.7500	0.6733
-10	7/8 x 14	0.8750	0.7874
-12	1-1/16 x 12	1.0625	0.9603
-16	1-5/16 x 12	1.3125	1.2103
-20	1-5/8 x 12	1.6250	1.5140
-24	1-7/8 x 12	1.8750	1.7728
-28	2-1/4 x 12	2.2500	2.1478
-32	2-1/2 x 12	2.5000	2.3978

The AN dash sizes were originally used for hard metal tubing – the dash number indicated the outside diameter in increments of 1/16". From this the inside diameter could be calculated (as the piping used was standardised). This convention was carried over to flexible hoses – the dash size being used to indicate the interior diameter of the hose (in 1/16"). This is no longer the case – if you need to know the internal diameter of FLEXOLITE hose, consult the Hose Data given in the corresponding section.

### B.S.P.

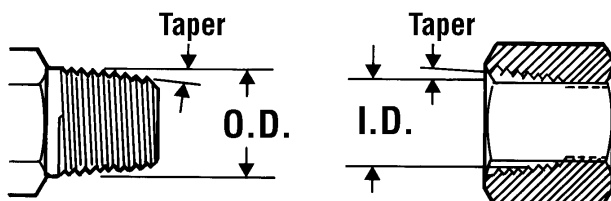
British Standard Pipe thread was widely used on British cars and components and is still found in use today. Male fittings have a 60° concave cone seating, females a convex cone (the opposite of JIC). There is also a tapered form – B.S.P.T. – but this is little used in competition plumbing, although it is found on older British cars. B.S.P. fittings occasionally use a Dowty washer (or similar) under their hex to effect a seal. (Female fittings will sometimes have a globeseal seat instead of a cone). B.S.P. is also found on Japanese motor industry's past history as a producer of British cars. There is also an inverted version of J.I.S. where the male fitting has a convex seat, the female a concave.



NOMINAL THREAD SIZE	MALE THREAD O.D. (INS)	FEMALE THREAD I.D. (INS)
1/8 x 28	0.383	0.337
1/4 x 19	0.518	0.451
3/8 x 19	0.656	0.589
1/2 x 14	0.825	0.734
5/8 x 14	0.902	0.811
3/4 x 14	1.041	0.950

## N.P.T.F.

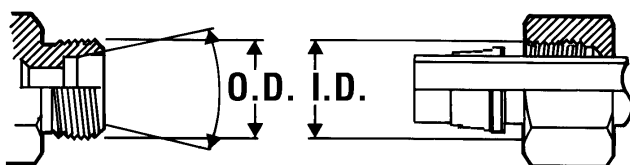
National Pipe Tapered Fuel is an American tapered thread widely used today by American manufacturers. As with B.S.P.T., the seal is made by deformation of the threads. In both cases the use of P.T.F.E. sealant tape (or similar) should be used to assist sealing.



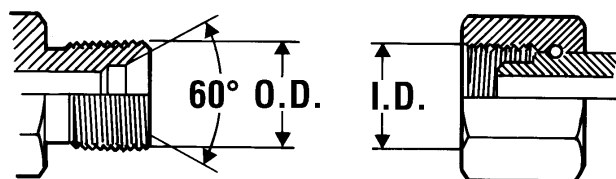
	MALE THREAD O.D. (INS)	FEMALE THREAD I.D. (INS)
1/8 x 27	0.4063	0.3438
1/4 x 18	0.5625	0.4688
3/8 x 18	0.6875	0.5938
1/2 x 14	0.8438	0.7188
3/4 x 14	1.0625	0.9375
1 x 11-1/2	1.3125	1.1875

## DIN7631/7647 & DIN 3901/3902

These are German specifications which are identical in threadform except in their 30mm sizes – 7631/2 has 30 x 1.50 pitch, 3901/2 has a 30 x 2.00 pitch. DIN7631/2 has a 60° conical seat, 3901/2 has a 20° cone. DIN3901/2 is easy to identify as its sealing is achieved by use of a compression olive.



DIN 3901/3902

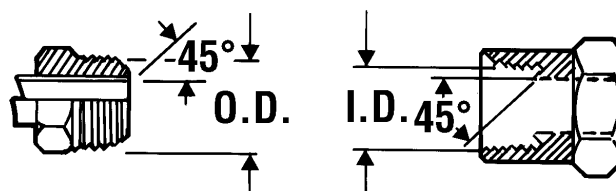


DIN 7631/7647

THREAD SIZE	MALE THREAD	FEMALE THREAD
	(O.D.) MM	(I.D.) MM
M10 x 1.00	10	8.5
M12 x 1.5	12	10.5
M14 x 1.5	14	12.5
M16 x 1.5	16	14.5
M18 x 1.5	18	16.5
M22 x 1.5	22	20.5
M26 x 1.5	26	24.5
M30 x 1.5	30	28.5

## S.A.E. INVERTED

Similar to – but not the same as – JIC. Some sizes are the same pitch, but the angle of the seating cone is different (sometimes 42°, sometimes 45°). Automotive engineering has a lot to answer for. This thread will most commonly be encountered on power steering systems (and occasionally on fuel lines) where it will appear as a tube nut on a flared pipe (as in brake pipes).



THREAD SIZE	MALE THREAD	FEMALE THREAD
	(O.D.) INS	(I.D.) INS
5/16 x 28	0.3125	0.2813
3/8 x 24	0.3750	0.3438
7/16 x 24	0.4375	0.4063
1/2 x 20	0.5000	0.4375
5/8 x 18	0.6250	0.5625
11/16 x 18	0.6875	0.6250
3/4 x 18	0.7500	0.6875
7/8 x 18	0.8750	0.8125
1-1/16 x 16	1.0625	1.0000

## KEY TO THREAD SIZE AND TYPE NUMBERING

The use of letters and numbers to identify thread sizes in this catalogue has been standardised to simplify identification of parts from their part numbers.

All end-fittings which connect directly to hoses and have standard JIC dimensions (see table) use the AN system – i.e. –04 = 7/16 x 20 t.p.i., –06 = 9/16 x 18 t.p.i. etc. Hose-end fittings which are not standard JIC (metric, BSP, etc) and all adaptors have an FLEXOLITE code which identifies their size and thread type – eg /51 = 1/8 x 28 BSP, /72 = 1/4 x 18 NPTF.

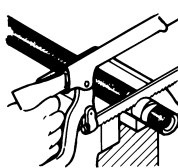
JIC/UNF THREAD	FLEXOLITE CODE	BSP THREAD	FLEXOLITE CODE
5/16 x 24	10	1/8 x 28	51
3/8 x 24	11	1/4 x 19	52
7/16 x 20	12	3/8 x 19	53
1/2 x 20	13	1/2 x 14	54
9/16 x 18	14	5/8 x 14	55
5/8 x 18	15	3/4 x 14	56
3/4 x 16	16	1 x 11	57
7/8 x 14	17	1-1/4 x 11	58
1-1/16 x 12	18	1-1/2 x 11	59
1-5/16 x 12	19	1-3/4 x 11	60
1-5/8 x 12	21	2 x 11	61
1-7/8 x 12	22		
2-1/4 x 12	23		
2-1/2 x 12	24		

NPT THREAD	FLEXOLITE CODE
1/8 x 27	71
1/4 x 18	72
3/8 x 18	73
1/2 x 14	74
3/4 x 14	75
1 x 11 1/2	76
1 1/4 x 11 1/2	77
1 1/2 x 11 1/2	78
1 3/4 x 11 1/2	79
2 x 11 1/2	80

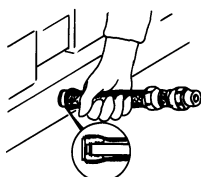
## METRIC

8 x 1.00	33	14 x 1.25	41
8 x 1.25	34	14 x 1.50	42
10 x 1.00	35	16 x 1.50	43
10 x 1.25	36	18 x 1.50	44
10 x 1.50	37	20 x 1.50	45
12 x 1.00	38	22 x 1.25	46
12 x 1.25	39	24 x 1.50	47
12 x 1.50	40	26 x 1.50	48
		30 x 1.50	49

## ASSEMBLY INSTRUCTIONS FOR S-TYPE HOSE



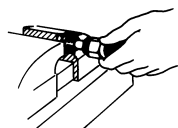
**I** Bind the hose with a couple of turns of masking tape and mark the exact point at which the cut is to be made. Cut through the tape using a bench-mounted shear, fine-toothed electric cutting wheel, or fine-toothed (24t.p.i.) hacksaw. Remove the tape, clean up any loose strands of wire, and ensure that the Teflon liner has been cut through cleanly.



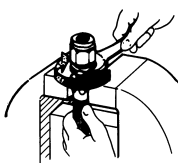
**II** Place both hose sockets onto the hose 'back-to-back' (one end of the hose generally flares out, the other stays put – slip the sockets over the end that has stayed put). Using a suitable FLEXOLITE mandrel, a pick, or a small screwdriver flare out or separate the Teflon liner from the stainless steel braid.

Ensure that the teflon liner will slip over the spigot of the hose fitting (the FLEXOLITE mandrel does this automatically during the flaring process) and then remove the fitting.

**III** Place the correct-sized olive onto the Teflon liner making sure that none of the steel braids slip in between the olive and liner. Push the olive onto the liner until the liner bottoms against the inner shoulder of the olive.



**IV** Hold the fitting tightly in a vice (using soft jaws or a vice with surface ground jaws in order not to damage the fitting) and push the hose and olive on to the fitting's spigot, making sure that it goes all the way home.

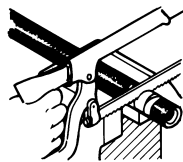


**V** Screw the collar onto the fitting by hand to begin with, and then, with the fitting mounted in the vice, with the correct-sized spanner. It is not necessary to screw the collar on all the way (although this is acceptable) – a gap of about 0.025 – 0.040" (0.65 – 1.00mm) between the collar and the fitting is generally

desirable. If assembling angled fittings or banjo fittings, check the alignment of the hose ends before turning the final turn.

It's a good idea to pressure test all assemblies before use. FLEXOLITE can supply, or advise on construction of, a test rig for this purpose.

## ASSEMBLY INSTRUCTIONS FOR N-TYPE HOSE



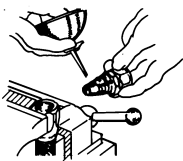
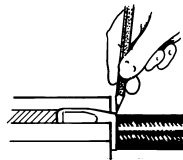
**I** Once the exact length of the hose has been ascertained – allowing for bends, obstructions, etc – wrap the hose tightly with one or two turns of masking tape. Mark the exact point at which the cut is to be made. Using a bench-mounted shear, fine-toothed cutting wheel, or fine-toothed hacksaw cut

through the hose cleanly and squarely. Remove any loose strands of wire and loose rubber liner.



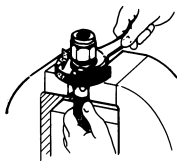
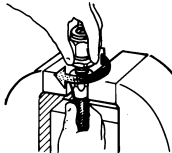
**II** Remove the masking tape and place the collar onto the hose (you may need to ‘screw’ it on). Ensure that the hose butts up against the internal shoulder of the collar, and then pull

the hose back until there is a gap of 1/16” – 1/8” (1.6 – 3.2 mm) between the end of the hose and the shoulder. Mark the outside of the hose with a felt-tip pen or a turn of masking tape.



**III** Lubricate the inside of the hose, collar, and fitting with light engine oil. Place the fitting in a vice (using soft jaws or a vice with surface ground jaws). Push the hose onto the nipple of the fitting (this may require some

force) and begin screwing the collar on to the fitting by hand. Ensure that the fitting is not cross-threaded and that there are no pieces of steel braid getting caught in the threads.



**IV** With the fitting held in the vice, push the hose onto the fitting with one hand and, with the other hand, screw the collar down using a suitable spanner (in fact a good adjustable spanner with deep jaws is ideal). Continue tightening until the collar is within 1/16” (1.50mm) of the fitting.

**V** Check the mark you were advised to make in step II of these instructions. During assembly there is often a tendency for the hose to back out of the fitting. If this has happened a gap will be apparent between the hose and the mark. If this gap is more than 1/16” you must re-assemble the hose.

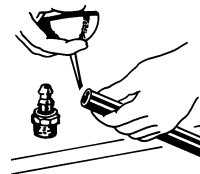
**VI** Clean off any excess oil used in step III and test the assembly before installation.

It’s a good idea to pressure test all assemblies before use. FLEXOLITE can supply, or advise on construction of, a test rig for this purpose.

## ASSEMBLY INSTRUCTIONS FOR P-TYPE HOSE

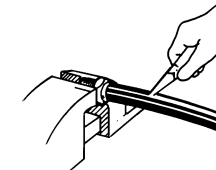
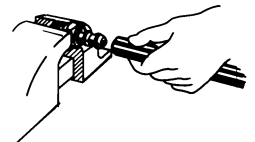
**I** Ascertain the correct length for the hose – including obstructions, bends, etc. Cut through the hose using a sharp knife or a fine-toothed hacksaw (24t.p.i.). Make sure that the cut is made squarely.

**II** Mount the fitting in a vice, ideally using soft jaws or a vice with surface-ground jaws. Make sure that the fitting is held firmly.



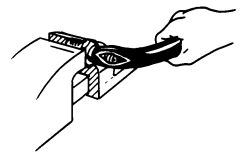
**III** Lubricate the inside of the hose with a little light engine oil. Place the hose on the spigot and then firmly push the hose home until it butts up against the end stop of the fitting. This may require some force, particularly with the larger sizes of hose,

which can be a very tight fit. (It is also a good idea when fitting hoses to straight female fittings to screw the fitting onto a male fitting or adaptor first; otherwise the spigot will push out of its retaining collar).



**IV** Disassembly is not a reversal of the assembly procedure. Once the hose is on its fitting the only way you will get it off is to cut along

the hose with a sharp knife and snap it off the fitting.



It’s a good idea to pressure test all assemblies before use. FLEXOLITE can supply, or advise on construction of, a test rig for this purpose.