The Earl's technical section contains details of what is meant by AN, NPT and various other esoteric names and numbers used in plumbing, plus outline drawings of common thread sizes. It also has instructions on assembling the various types of hose ends to the hose. We recommend that you have a look at this section before doing anything.

Automotive Plumbing is like a jigsaw puzzle, lots of bits and pieces all looking much the same and no real guide as to where they go.

The Earl's® catalog shows you the bits and pieces. The following notes will help novice plumbers to sort out which ones to use and hopefully provide a start to developing skills which will make more advanced plumbing a lot easier when you come to it.

TOOLS YOU WILL NEED

Basic plumbing requires:

- **Vice with soft jaws** to avoid marking aluminum fittings - available from Earl's® (P/N 004ERL and 005ERL - page 101)
- **Fine bladed hacksaw, angle grinder or chop saw** - for cutting hose.
- **Set of wrenches**. **NOTE:** Aluminum wrenches which reduce marking of aluminum adapters and hose ends are available from Earl's. (Page 99)
- **Ruler** - or preferably Vernier gauge - for measuring hose and barb fitting diameters.
- **Tape measure**- minimum extended length 10ft (3m) for measuring hose and hose run lengths.
- **Length of string or thin wire** - to assist in measuring lengths of existing or planned hoses.
- **Screwdrivers** - flat blade type.
- **Good straight Tin Snips** - recommended for cutting and trimming TUBE-BRAID™ sleeves.
- **Duct Tape or similar to wrap hose** - prior to cutting. (ALWAYS wrap to prevent fraying).
- **Earl's® Assembly lube (P/N 184004ERL - page 102), Sewing machine oil or clean engine oil** - used on hose end threads before assembling ends to hose.

If you intend to assemble Speed-Flex™ brake lines in sizes 3 or 4 with reusable Speed-Seal™ hose ends you will need a Earl's® braid spreader (P/N 007ERL - page 98) and a utility knife.

THE MOST IMPORTANT BASIC CONCEPTS

1. **Hose diameter**. The inside diameter of an original hose is most important - it is this which determines what sizes of stainless braided hose you will use to replace it. The outer diameter is only of use when determining which size of Earl's® Tube-Braid™ Sleeve or Flame Guard or Econ-O-Fit™ to apply if covering the old hose rather than replacing it.

2. **Hose sizes**. You will find each type in the Earl's® catalog has a size number - 4,5,6 etc. Nearly all the hose ends and adapters also have a size number. For each size, there is a whole family of parts whose part number usually ends in the size number to go with the size of hose. A hose end of 6 will fit the hose size 6. **For example:** Auto-Flex™ hose 300006ERL works with Auto-Fit™ hose ends 300106ERL, 309106ERL, etc. and adapters 981666ERL, 982206ERL, etc. And such parts as in-line filter 230106ERL.

3. **Thread sizes.** The Earl's® catalog provides outlines of the most common NPT and AN threads on pg. 111. If in complete doubt, a thread gauge may be useful to you. Metric threaded adapters to convert from metric holes to AN hose end threads are shown in the Earl's® catalog as well.

BASIC STREET MACHINE PLUMBING

You will be looking most often at the following product types: Auto-Flex™ and Pro-Lite 350™ hoses, Tube-Braid™ stainless steel sleeving, Econ-O-Fit™ clamps, Auto-Fit™ and Swivel Seal™ hose ends, fuel line kits, pipe thread to AN adapters and carburetor/power steering/fuel pump adapters.

1. **Radiator hoses.** Due to their often complex curvature and wide range of sizes pre-braided Auto-Flex™ or Perform-O-Flex™ hose usually cannot be used . Instead we recommend the use of Earl's® Tube-Braid™ sleeve (Page 104) or Form-A-Flex™ radiator hose (Page 59).

2. **Heater hoses.** These may be covered with Tube-Braid™ sleeve, but should preferably be replaced with Auto-Flex™ hose as over a long length its pre-braided cover looks much better! Usually sizes 10 or 12 is suitable. Measure either the inside diameter of the hose you are replacing or the outside diameter of the barb that the old hose pushed over and this will tell you what size of hose to use. Size 12 hose (11/16") will clamp down OK onto 5/8" barbs. Fix in place with Econ-O-Fit™ hose ends of the correct size for the hose or for the old hose + sleeve + tape. Usually sizes 10 or12 for proper braided hose, size 14 if you used Tube-Braid™ sleeves.

3. **Fuel lines.** Normally you will do these using size 5,6,7 or 8 Pre-braided hose or Pro-Lite 350™ hose to replace the original hose, and appropriate hose ends or Econ-O-Fit™ hose clamps.

4. If you have replaced your carburetor with, lets say, a Holley® carburetor, and a Holley® regulator, you will need to look at going to a complete AN replacement for your plumbing system. Hose ends, hose, adapters and a fuel kit of the appropriate sizes.

5. **Other hoses.** There may be other hoses, breathers, overflows, etc. that you want to replace with Earl's® stainless braided hose and fittings. Just measure internal diameter and length and select the appropriate hose, hose ends or Econ-O-Fit™ clamps to suit.

6. **Oil & Transmission coolers.** If you want to fit an engine or transmission cooler to your vehicle, first work out where you want to put it and determine the space available. Select a cooler from Earl's® extensive range of Temp-A-Cure™ coolers (Page 62). Then the right sandwich adapter to enable you to plumb the cooler to the vehicle. Oil coolers generally use size 10 hose and hose ends and pipe thread to AN adapters. Transmission coolers generally use size 6 or 8 to plumb the cooler.

7. A table with suggested engine oil cooler sizes follows. Note that climactic conditions, degree of engine tune and modifications etc. may mean the suggested cooler is not to be the exact one you need - consult your dealer or Earl's® tech line **1-310-609-1602.**

ENGINE SIZE	COOLER NO.
1000-1500 cc	**41310ERL**
1501-2500 cc	**41610ERL**
2501-4000 cc	**41910ERL**
4001-5000 cc	**42510ERL**
5001-6000 cc	**43410ERL**

MOST IMPORTANT OF ALL...
Don't despair if you don't get it all, or don't get it all right the first time around. If your dealer is conveniently close, don't buy everything at once. Get a little at a time until you gain confidence. And if you bought something that doesn't fit, the dealer may, although he is under no obligation to do so, take it back in part exchange for what you really needed all along, as long as you haven't damaged or marked the part you didn't want!

BRAKE HOSES
These days road-going vehicles in most countries have to have flexible brake hoses complying with various rules and regulations. So if your vehicle is street registered, we suggest you use Earl's Hyperfirm™ street legal hoses.

If your vehicle does not have to comply with such regulations, Earl's® huge range of reusable Speed-Seal™ hose ends for Speed-Flex™ Teflon™ hose will let you do pretty much anything. For adapters to suit most brake system components, check out steel brake hydraulic adapters. We strongly suggest you use sizes 2 or 3 Speed-Flex™ for brakes and size 4 Speed-Flex™ for clutch hoses.

ONLY use Earl's® Speed-Flex™ Teflon™ hose for brakes and clutches. Other types of Earl's® hose are totally unsuited to the brake and clutch application and may cause accidents leading to injury or death.

RACE CAR AND SPEED BOAT PLUMBING
Mechanics plumbing high performance competition vehicles and boats will usually have considerable experience in the use of stainless braided and other hoses, so here are only a few general notes too follow.

1. **Hose to use.** We suggest Earl's® Perform-O-Flex™ hose to provide the ultimate in reliability for almost all your needs.. If the chemicals in some modern fuels and lubricants cause a problem, sometimes shown by a smell of petrol, consider using Teflon® lined Speed-flex™ hose. Where ease of use, reduced weight and low pressure are a consideration, Earl's® Super Stock™ & Pro-Lite 350™ hose may be suitable. For high end plumbing requirements use our premium smooth bore Teflon™/Kevlar™ covered Ultra-Flex 650™ hose.

2. **Hose ends to use.** With Perform-O-Flex™ hose use Swivel-Seal™ or Auto-Fit™ hose ends. Super Stock™ hose ends should be used with Super Stock™ hose. Speed-Seal™ hose ends must be used with Speed-Flex™ hose. Pro-Lite 350™ hoses uses Swivel-Seal™, Auto-Fit™ or Auto-crimp™ hose ends. Ultra-Flex 650™ hose must use Ultra-Flex hose ends.

3. **Adapters to use.** The Earl's® catalog list a range of adapters suited to all Earl's® hose ends. Where lack of space make life awkward, consider using the special Swivel-Seal™ hose ends which have adapters built into them. Dry sump pumps and similar pumps usually work best with Earl's® Port adapters in them. Note that when using NPT pipe thread adapters you should apply Teflon® tape or pipe sealant, Loctite 567 or similar products to the tapered threads before wrenching them up.

INSTALLATION

While Earl's hose and hose ends make a pretty fool-proof combination, there are a few general rules to follow to make sure that you end up with a sanitary and trouble-free installation:

1. Make sure that there is adequate clearance between the hose ends and anything that they might be able to contact. While the hose is flexible, the hose ends are not!
2. Do not allow the hose to contact a sharp corner, nut, bolt, rivet stem or anything else that might cause damage. At any point where a hose passes through a panel, install a grommet for chafe protection.
3. Do not allow the hose to rub against anything—even if the surface on which it rubs is flat. The stainless steel braid is a very efficient low speed file and will abrade through anything that it moves against. In order to prevent chafing and to keep your hoses where you meant for them too be support the hoses every 18" or so with either a cushion clamp or a ty-wrap.
4. Do not force the hose into too tight a bend. Follow the minimum bend radius chart. Do not kink the hose, either by too tight a bend, by misalignment between the hose end and the part or adapter on short assemblies or by getting the whole assembly into a helix on long assemblies. Align the hose end with the adapters so that the hose is not placing strain on the hose end or on the adapter. The SWIVEL-SEAL design reduces these problems, but only care in installation will eliminate them. We manufacture enough hose end and adapter configurations to allow a sanitary and sound solution to just about any installation problem.
5. Keep the hoses as far away from extreme heat sources (like turbochargers and exhaust systems) as possible. If you must run close to such things, use an air gap insulating panel and/or fire resistant Flame Guard (pg 104) sheathing. Do not run fuel lines in proximity to hot fluid lines (or anything hot) or you will end up with either hot fuel and low power or vapor lock. Do not run hot fluid lines near cool fluid lines or near to the driver.
6. Do not over-tighten the hose ends onto the adapter fittings or parts. The seal is achieved by the design of the mating surfaces—not by muscle. It helps a lot to use the wrenches made for the job. (See page 99)

MAINTENANCE

Virtually no maintenance is required. Basically, maintaining Earl's high performance plumbing hose ends is a question of preventing abuse.

1. Inspect the plumbing installation frequently for signs of chafing, abrasion, kinking, crushing or seepage.
2. Take care not to crush, stretch, kink or otherwise damage the hose assemblies when changing engines etc.
3. Keep both hoses and fittings CLEAN.
   (a) Before removing any hose end from its adapter or port, wash the assembly down with solvent—or even gasoline—and blow it clean and dry so that no grit can find it's way into the threads or the sealing surfaces.
   (b) As soon as the hose end has been removed, install a CLEAN protective plug into the hose end and a CLEAN cap onto the adapter. This will keep dirt out of the lines and the fittings and will keep the fluid off the floor, the machine and the mechanic.
   (c) Always inspect both hose ends and adapters for dirt before reassembly.
   (d) Correctly assembled Earl's hose ends will not leak if they, and the adapters are undamaged, clean and properly tightened. The only way to be certain that every hose end is properly tightened is to form the habit of NEVER leaving the adapter, a hose end (or anything else) loose, finger tight or partially tightened. Even when you know that you are going to take the thing right off again, correctly tighten it—every time.

LEAKS

If it leaks, it has probably been assembled incorrectly or the sealing surfaces on the adapter and the nipple have been damaged—or just possibly someone has attempted to assemble an AN 37° seat hose end into a 45° SAE cone. Damage to the cone or the seat can be caused by a multitude of sins—dirt and over-tightening being the most common.

RE-USE

All of Earl's removable hose ends are completely reusable as is the hose and as are most of the competing brands. As usual, Earl's has an edge. When disassembling a nipple and cutter type hose end, it is very common for the inner tube of the liner, which is captured between the nipple and cutter, to be torn off and to remain in place. If this happens, the rubber must be removed before the hose end can be reused—and it is a bear to get out. With SWIVEL-SEAL the chances of this happening are greatly diminished because the cutter can rotate with respect to the nipple so that the rubber is faced with only one moving surface. The procedure is as follows: Place the socket in a vise, and with a wrench on the nipple and another on the cutter, hold the nipple and turn the cutter until the socket is disengaged. Then pull the hose off the nipple. All parts of the SWIVEL-SEAL are ready for reuse as soon as they have been cleaned and relubricated.

"AN" THREAD SIZES

"AN" (Army-Navy) Sizes were established by the Aerospace industry years ago and were the designated O.D. of the rigid metal tube that each size fitting is used with. (The chart to the right will clarify this point.)

The numbers assigned equate to the O.D. (outside diameters) of the tubing in 1/16". Since tubing and hoses are to be found with assorted wall thicknesses we can now understand that the designated size number does not necessarily tell you how large the inside diameter will be. (For example, the inside diameter of an Earl's size 6 hose end is nearly as large as the inside diameter of some other manufacturers' -8 hose ends.)

Each AN size number has its own standard thread size which can be seen in column three of the chart. Again, these are the same thread sizes that have been used in aircraft and industrial applications for many years.

AN SIZE	METAL TUBE O.D.	THREAD SIZE
2	1/8	5/16-24 SAE
3	3/16	3/8-24 SAE
4	1/4	7/16-20 SAE
5	5/16	1/2-20 SAE
6	3/8	9/16-18 SAE
8	1/2	3/4-16 SAE
10	5/8	7/8-14 SAE
12	3/4	1-1/16-12 SAE
16	1"	1-5/16-12 SAE
20	1-1/4	1-5/8-12 SAE
24	1-1/2	1-7/8-12 SAE
28	1-3/4	2-1/4-12 SAE
32	2"	2-1/2-12 SAE

National Pipe Threads (NPT) are the next most popular thread size used in "Competition Plumbing." We can actually find a resemblance between the size call outs and the I.D. (inside diameter) of the fitting as shown in the chart below.

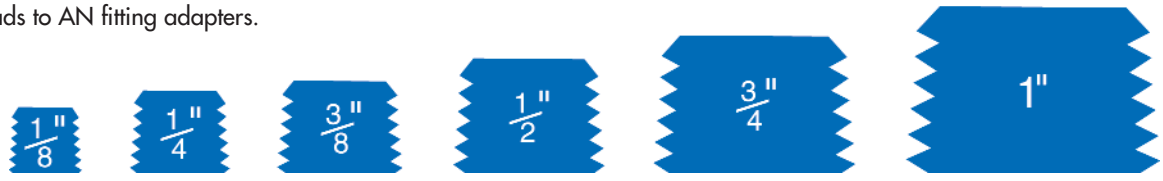
"NPT" THREAD SIZES

Some of the most popular adapter fittings shown in our catalog are AN to NPT adapters. While many variations are offered, column four in the chart shows which AN size corresponds to each NPT size when inside diameters (flow dimensions) are considered.

All Earl's Swivel-Seal™ hose ends are designed to provide little or no restriction when used with the corresponding AN fitting size.

We also offer a number of Metric threads to AN fitting adapters.

PIPE THREAD SIZE	THREADS PER INCH	THEORETICAL I.D. OF FTG.	CLOSEST AN FTG. SIZE
1/16"	27	1/16"	
1/8"	27	1/8"	4
1/4"	18	1/4"	6
3/8"	18	3/8"	8
1/2"	14	1/2"	10
3/4"	14	3/4"	12
1"	11–1/2	1"	16
1–1/4"	11–1/2	1–1/4"	20
1–1/2"	11–1/2	1–1/2"	24
2"	11–1/2	2"	32

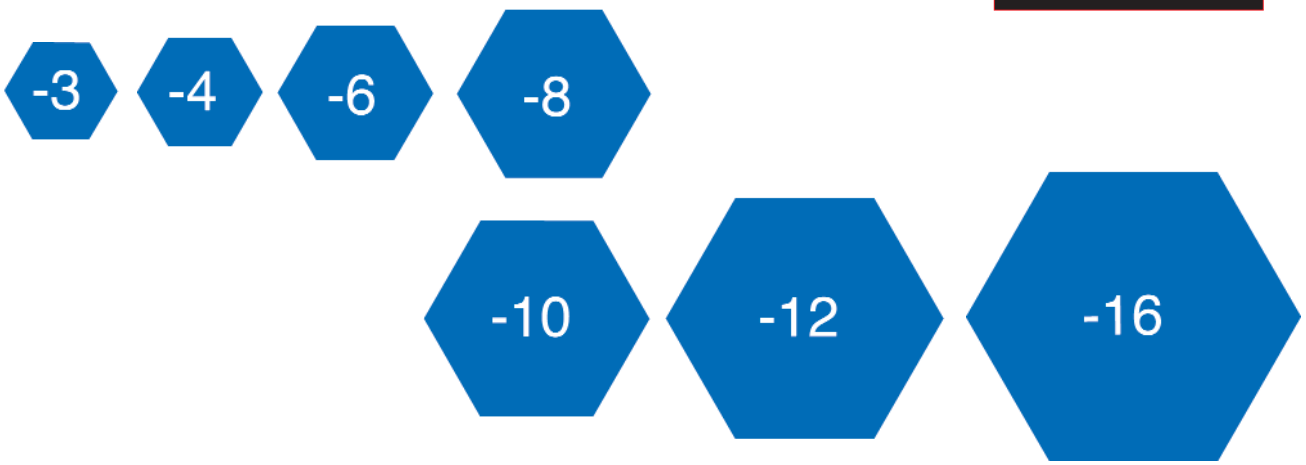


B-NUT SIZES & HOSE-TO-HOSE END CHART

B-NUT CHART

The following chart are the actual size of B nuts used on hose ends and adapters.

Pressure Test All Hose Assemblies Before Installation!



HOSE TO HOSE END COMPATIBILITY CHART

Hoses \ Hose Ends	Swivel-Seal™	Auto-Fit™	Auto-Crimp™	Auto Mate™	Ultra-Flex™	Super Stock™	Power Steering
Pro-Lite 350™	●	●	●				
Perform-O-Flex™	●	●		●			
Auto-Flex™	●	●		●			
Ultra-Flex 650™					●		
Super Stock™						●	
Power Steering™							●
Speed-Flex™							

TORQUE VALUES

The table below gives the torque tightening values for JIC (AN) fittings in both stainless steel and aluminum. When a combination of aluminum and stainless steel fittings are being mated always use the aluminum fitting torque values

DASH SIZE	ALUMINUM INCH/LVS MIN-MAX	NEWTON/m MIN-MAX	STAINLESS STEEL INCH/LBS MIN-MAX	NEWTON/m MIN-MAX
-02	50 - 80	5.64 - 9.03	75 - 120	8.47 - 13.55
-03	70 - 105	7.90 - 11.86	95 - 140	10.73 - 15.81
-04	100 - 104	11.29 - 15.81	135 - 190	15.25 - 21.46
-05	130 - 180	14.68 - 20.33	170 - 240	19.20 - 27.11
-06	150 - 195	16.94 - 22.03	215 - 280	24.29 - 31.63
-08	270 - 350	30.50 - 39.54	470 - 550	53.08 - 62.14
-10	360 - 430	40.67 - 48.58	620 - 745	70.05 - 84.17
-12	460 - 550	51.97 - 62.14	855 - 1055	96.60 - 119.18
-16	700 - 840	79.08 - 94.90	1140 - 1370	128.80 - 154.78
-20	850 - 1020	96.03 - 115.24	1520 - 1825	171.73 - 206.19
-24	900 - 1080	101.68 - 122.02	1900 - 2280	214.67 - 257.60
-32	1800 - 2000	203.37 - 255.97	2660 - 2940	300.54 - 332.17

The torque values apply to machined fitting connections only, not flared tube or compression. Fitting mating faces and threads should be lubricated prior to assembly. Generally the system working fluid (engine oil, hydraulic etc.) is used. If another lubricant is used, insure it is compatible with the working fluid and system. Dry assembly should be avoided if all possible.

It is important not to over tighten hose fittings to their mating adapters. Over tightening causes permanent deformation of the fitting seat (37º AN flare) and will result in the mating adapter sealing face to be made concave, this will inhibit repeated reliable use of both the fitting and the adapter.

ULTRA-FLEX 650™ CRIMP DIMENSIONS

The target settings for the Earl's Ultra-Flex 650™ Kevlar & Stainless Steel covered hose, to be applied when using the Earl's Ultra-Flex Crimper and dies, are provided to aid in establishing actual diameters. While the Earl's Ultra-Flex crimper and dies for our Ultra-Flex hose will give crimp diameters close to, or at, specified diameters, the machine operator must check to verify actual dimensions.

SIZE	Dia. after Crimp (in.)	Dia. After Crimp (mm)
-4	Ø 0.465 +/- .005	Ø11.81mm +/- .12mm
-6	Ø 0.606 +/- .005	Ø15.39mm +/- .12mm
-8	Ø 0.800 +/- .005	Ø20.32mm +/- .12mm
-10	Ø 0.930 +/- .005	Ø23.6mm +/- .12mm
-12	Ø 1.151 +/- .005	Ø29.23mm +/- .12mm
-16	Ø 1.345 +/- .005	Ø33.63mm +/- .12mm

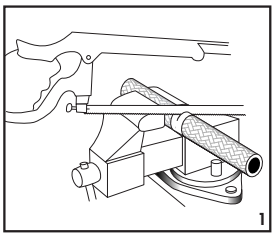
Failure to follow these instructions could result in serious injury or property damage during crimping. Improperly crimped fittings can be dangerous to the user of the hose assembly.

- Do not crimp Earl's hose or fittings with another manufacturer's hose or fitting.
- These dimensions are for Earl's Ultra-Flex Kevlar & Stainless covered hose and Ultra-Flex hose ends only.
- Wear safety glasses and keep hands away from moving objects.
- Always check for proper crimping dimensions

Always test assemblies for leakage prior to installation.

Pressure Test All Hose Assemblies Before Installation!

SWIVEL-SEAL™ HOSE ENDS WITH PERFORM-O-FLEX™,PRO-LITE 350™ OR AUTO-FLEX™ HOSE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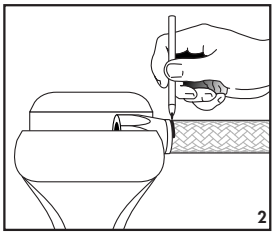
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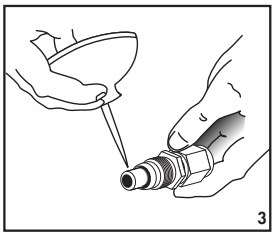
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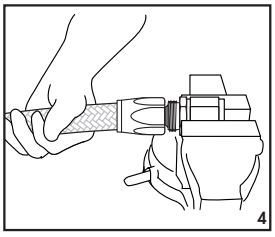
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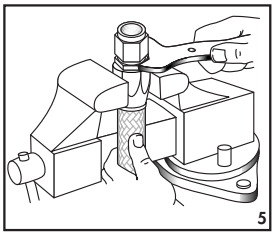
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1. Cut the hose to the required length.
a. Measure distance between ports or adapter fittings along the path that the hose run will follow —allowing for bend radius, hose end length and offset to obtain length and hose required.
b. Cut the hose square with a radiac wheel or a sharp 32 teeth per inch hacksaw blade. It is necessary to wrap it tightly with electrical or masking tape before cutting and to cut through the tape. This helps to prevent the stainless wire braid from fraying.
c. Trim any frayed ends of the braid with a sharp pair of metal snips or diagonal cutters and remove the tape.

2. Place the socket in a vise and insert the end of the hose into the socket until the hose butts against the bottom of the threads provided for the cutter. Gently pull the hose back until there is a 1/16" to 1/8" gap between the end of the hose and the bottom of the threads —mark hose at bottom of socket with a felt pen so that you can detect any tendency of the hose to be pushed out as you complete the assembly.

3. Lubricate the inside of the hose, the cutter threads and the socket threads with Earl's assembly lube or engine oil. Place the nipple in a vise.

4. Holding the hose and not the socket, push the hose and the socket onto the nipple until the socket threads can be started on the cutter. Holding the hose and not the socket, start the threads and go as far as you can by hand. Depending on the size of the hose, some force may be necessary in this part of the operation.

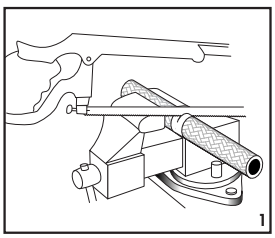
5. To complete the assembly it doesn't matter whether the nipple or the socket is held in the vise. Holding one or the other in the vise and using a suitable wrench on the other, tighten the socket onto the cutter threads until the socket is within .060" of bottoming on the nipple. Do not use an adjustable or over-size wrench or you will damage either the nipple or the socket.

6. Check the mark that you made on the hose in Step 2. If the hose has backed more than about 1/16" out of the socket as you assembled it, return to Step 3.

7. Clean the hose and the hose ends with CLEAN solvent.

8. **Pressure test the assembly before letting it out of your sight. Further check the assembly by running the system at full pressure while you observe the hose, hose ends, and adapters for leaks.**

AUTO-FIT™ HOSE ENDS WITH PERFORM-O-FLEX™, AUTO-FLEX™, OR PRO-LITE 350™ HOSE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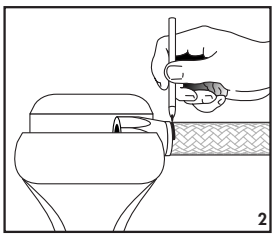
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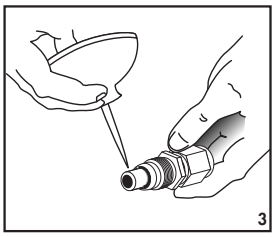
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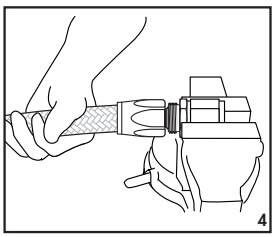
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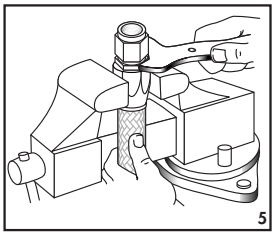
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1. Cut the hose to the required length.
a. Measure distance between ports or adapter fittings along the path that the hose run will follow —allowing for bend radius, hose end length and offset to obtain length and hose required.
b. Cut the hose square with a radiac wheel or a sharp 32 teeth per inch hacksaw blade. It is necessary to wrap it tightly with electrical or masking tape before cutting and to cut through the tape. This helps to prevent the stainless wire braid from fraying.
c. Trim any frayed ends of the braid with a sharp pair of metal snips or diagonal cutters and remove the tape.

2. Place the socket in a vise and insert the end of the hose into the socket until the hose butts against the bottom of the threads. Gently pull the hose back until there is a 1/16" to 1/8" gap between the end of the hose and the bottom of the socket —mark hose at bottom of socket with a felt pen so that you can detect any tendency of the hose to be pushed out as you complete the assembly.

3. Lubricate the inside of the hose, the nipple threads and the socket threads with Earl's Assembly Lube or Engine Oil. Place the nipple in a vise.

4. Holding the hose and not the socket, push the hose and the socket onto the nipple until the socket threads can be started on the nipple. Holding the hose and not the socket, start the threads and go as far as you can by hand. Depending on the size of the hose, some force may be necessary in this part of the operation.

5. To complete the assembly it doesn't matter whether the nipple or the socket is held in the vise. Holding one or the other in the vise and using a suitable wrench on the other, tighten the socket onto the cutter threads until the socket is within .060" of bottoming on the nipple. Do not use an adjustable or over-size wrench or you will damage either the nipple or the socket.

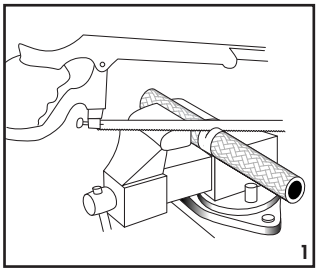
6. Check the mark that you made on the hose in Step 2. If the hose has backed more than about 1/16" out of the socket as you assembled it, return to Step 3.

7. Clean the hose and the hose ends with CLEAN solvent.

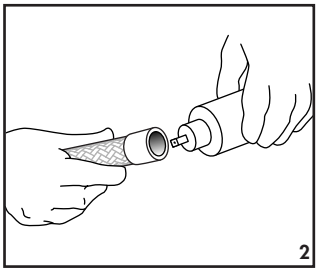
8. **Pressure test the assembly before letting it out of your sight. Further check the assembly by running the system at full pressure while you observe the hose, hose ends, and adapters for leaks.**

Pressure Test All Hose Assemblies Before Installation!

AUTO-CRIMP™ Hose Ends with PERFORM-O-FLEX™ , PRO-LITE 350™ or AUTO-FLEX™ Hose



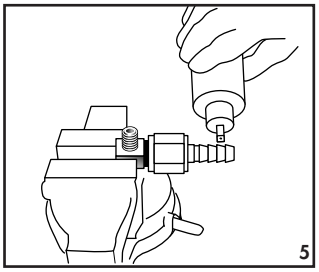
1. Cut the hose square with a radiac wheel or a fine tooth hacksaw. It is necessary to wrap the hose tightly with masking or electrical tape and to cut through the tape. This helps to prevent the stainless braid from fraying.



2. Trim any frayed ends of the braid with sharp snips or diagonal cutters and remove the tape.

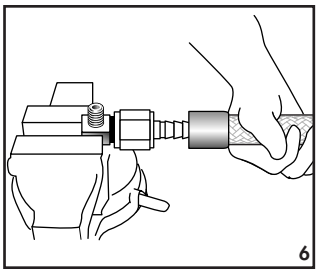
3. Slip the AUTO-CRIMP collar over the end of the hose.

4. Lubricate the inside of the hose and the outside of the AUTO-MATE nipple.

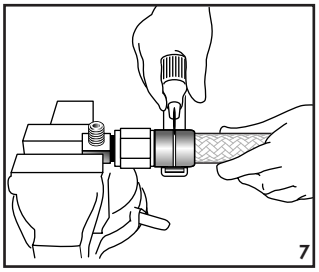


5. Place a suitable adapter fitting in a vise. Screw the AUTO-MATE hose end onto the adapter and tighten.

6. Push the AUTO-MATE hose end into the hose until it bottoms against the collar.

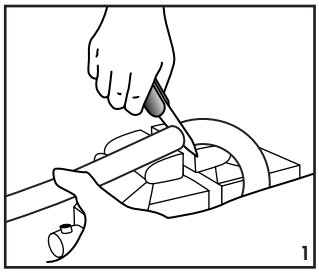


7. Place the AUTO-CRIMP tool approximately in the center of the collar. Tighten the roller until it contacts the collar. Alternately turning the handle and tightening the roller, crimp the collar until its diameter has been reduced sufficiently to show the hose end barbs as ridges in the collar.

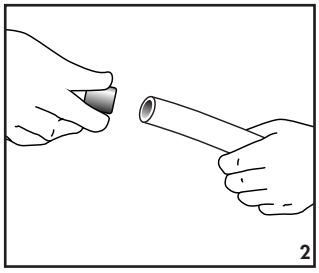


8. Blow the assembly clean and pressure test before running the car.

SUPER STOCK™ Hose Ends with SUPER-STOCK™ Hose

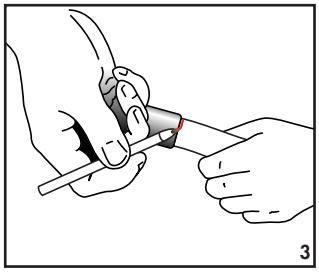


1. Cut the hose square with a sharp knife.

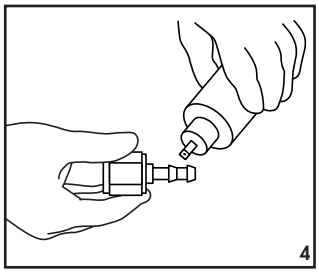


2. Slip the aluminum collar over the hose.

3. Mark the hose at the back of the collar.

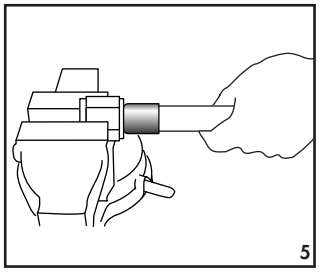


4. Lubricate the inside of the hose and the outside of the nipple. Use assembly lube or engine oil. Do not use a silicon-based lube.



5. Push the hose end into the hose until it bottoms.

6. Check the mark made on the hose in Step 3 to ensure that the hose end has indeed bottomed against the end of the hose.

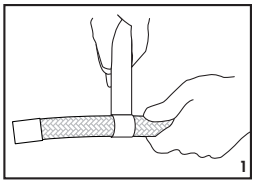


7. Blow the assembly clean and pressure test before running the car.

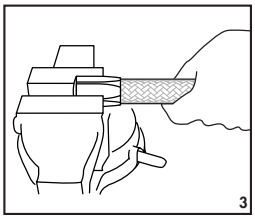
***Hose ends should be crimped if close to 250 PSI max.**

Pressure Test All Hose Assemblies Before Installation!

POWER STEERING HOSE ENDS WITH POWER STEERING HOSE

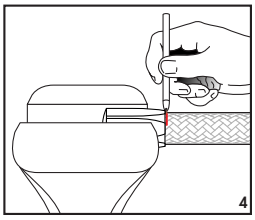


1. Cut the hose square with a radiac wheel or a fine tooth hacksaw. It is necessary to wrap the hose tightly with masking or electrical tape and to cut through the tape. This helps to prevent the steel braid from fraying.



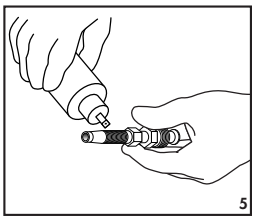
2. Trim any frayed ends of the braid with sharp snips or diagonal cutters and remove the tape.

3. Thread the socket over the end of the hose until it bottoms. NOTE: Thread is left handed.

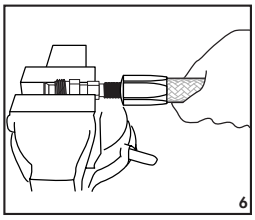


4. Mark the hose at the back end of the socket.

5. Lubricate the inside of the hose and the outside of the nipple (including the threads).

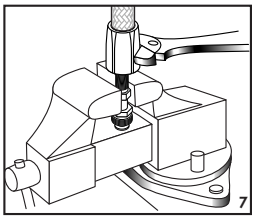


6. Push the hose end into the hose and thread the nipple onto the hose end as far as possible by hand.



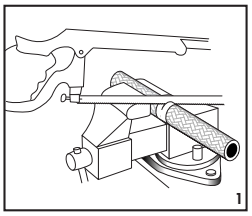
7. Clamp the nipple in a vise and tighten the hose end until it bottoms against the nipple.

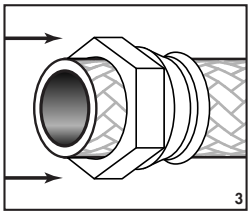
8. Check the mark made on the hose in Step 3 to ensure that the hose did not back out of the socket while tightening.

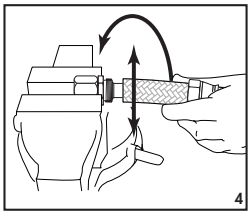


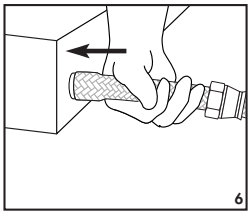
9. Blow the assembly clean and pressure test before running the car.

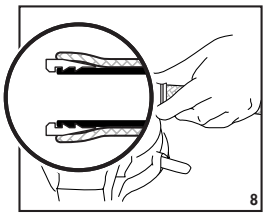
SPEED-SEAL™ HOSE ENDS WITH SPEED-FLEX™ HOSE

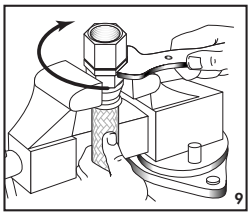












BRAKE LINES are critical items. The potential penalties for improper assembly are severe. Although there is nothing complicated about the procedure and no special tools are required, extreme care must be used in assembly. We strongly recommend that the following procedures be used:

1. Cut the hose to the required length. We recommend the use of a radiac wheel but it can be done satisfactorily with a 32 teeth per inch hacksaw blade. In either case, the hose must be tightly wrapped with electrical or masking tape and the cut made through the tape. Do not cut SPEED-FLEX hose with a chisel, snips, pliers, or a shear as these may crush the Teflon liner.

2. De-burr the Teflon and trim any loose ends of braid with sharp snips or diagonal cutting pliers.

3. Install the socket on the hose with the threaded end of the socket toward the cut end of the hose. This will be a lot easier and you will end up with fewer holes in your hand if you clamp the socket in a vise. Push socket on well beyond end.

4. Place the hex portion of the nipple in the vise. Insert the end of the hose onto the nipple and bottom the hose against the chamfer seat of the nipple with a rotary motion of the hose. This will size the I.D. of the Teflon tube.

5. Separate the braid from the O.D. of the Teflon tube. The best way is to use Earl's special braid spreader tool for sizes 3+4 (see Plumbing Accessories Section).
In the absence of the tool, separate the braid with a small screwdriver or a scribe. Be careful not to scratch or nick the Teflon.

6. Install the sleeve between the braid and the Teflon tube. Make sure that none of the braid is trapped between the Teflon and the sleeve. Bottom the tube against the shoulder of the sleeve and make sure that the sleeve is inserted square.

7. With the nipple held in the vise, push the hose and the sleeve onto the nipple until the sleeve bottoms. Remove the hose and make sure that the Teflon tube is still bottomed against the shoulder of the sleeve and that the sleeve is still square.

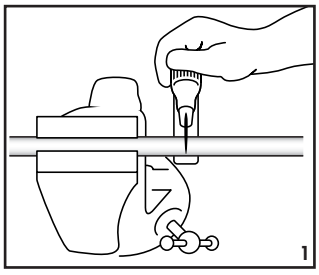
8. Push the hose and sleeve back onto the nipple and bottom against the chamfer. Oil the nipple threads. Start the socket onto the nipple threads and hand tighten.

9. Place the socket in the vise and complete the assembly by tightening the nipple onto the socket with a wrench until the gap between the face of the socket and the hex of the nipple .023" to .046" —use a feeler gauge.

10. Blow the assembly clean and pressure test before running the car.

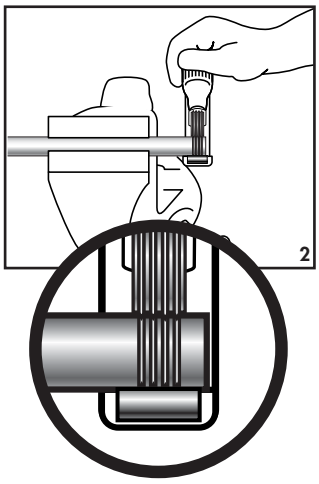
Pressure Test All Hose Assemblies Before Installation!

TUBE-MATE™, AUTO-FIT™ HOSE ENDS


1

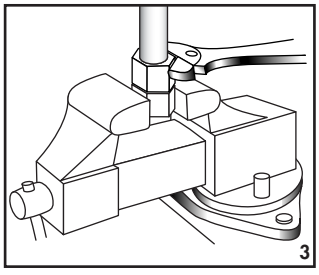
1. Assemble the tube-mate end onto the hose onto the hose per Auto-Fit hose and instructions.

2. Cut and de-burr the tubing. The cut must be square.


2

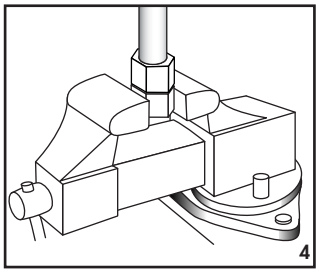
3. Using the TUBE-MATE grooving tool, groove the tubing. The tubing may also be beaded (or barbed). See Earl's new tube beading tool.

4. Push the tubing into the correct size Tube-Mate until it bottoms.


3

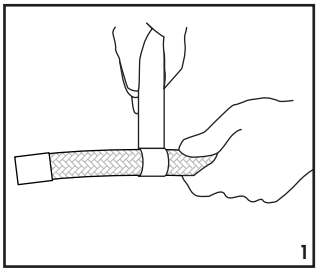
5. Tighten the TUBE-MATE nut.

6. Blow the assembly clean and pressure test before running the car.

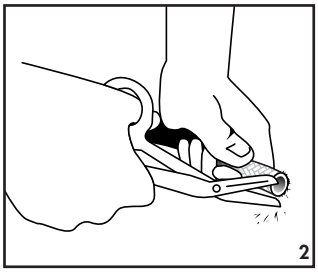

4

NOTE: TUBE-MATE hose ends are designed to be used only with beaded, barbed or grooved rigid tubing at no more than 25 psi working pressure.

AUTO-MATE™ HOSE ENDS WITH PERFORM-O-FLEX™ AUTO-FLEX™ OR PRO-LITE 350™ HOSE

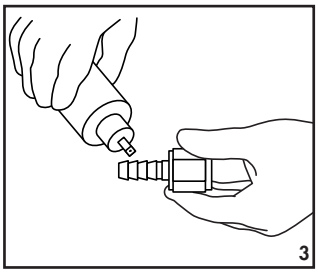

1

1. Cut the hose square with a Radiac wheel or a fine tooth hacksaw. It is necessary to wrap the hose tightly with masking or electrical tape and to cut through the tape. This helps to prevent the stainless braid from fraying.


2

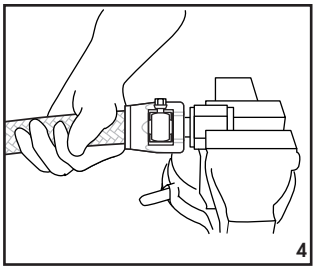
2. Trim any frayed ends of the braid with sharp snips or diagonal cutters and remove the tape.

3. Slip the ECON-O-FIT collar over the end of the hose.


3

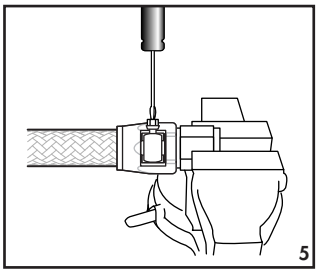
4. Lubricate the inside of the hose and the outside of the AUTO-MATE nipple.

5. Push the AUTO-MATE into the hose until it bottoms against the socket.


4

6. Tighten the ECON-O-FIT hose clamp.

7. Blow the assembly clean and pressure test before running the car.


5

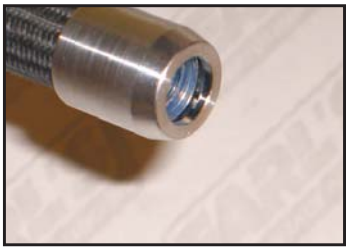
ULTRA-FLEX™ HOSE ENDS WITH ULTRA-FLEX 650™ HOSE

1. Prepare to cut UltraFlex 650 hose. Wrap hose tightly with thin packing tape to prevent Kevlar braid from fraying during cutting.

2. Use the Earl's UltraFlex Hand Hose Cutter to cut hose. Use a sharp blade as to not crush the Teflon® hose during the cutting process.

3. Cut hose square or perpendicular to centerline of hose. No loose or fraying Kevlar braids are to be present.

4. Insert crimp collar onto UltraFlex hose. Do not remove thin tape as adhesive from tape might unravel Kevlar braid.



5. Push UltraFlex hose into crimp collar and verify that hose end bottoms inside of collar.

6. Insert UltraFlex fitting nipple into collar and hose assembly as shown.

7. Prepare the UltraFlex Crimper for operation.

8. Verify correct size crimp die. When inserting die into crimper insure that the bottom of die (shown) mates correctly with die bowl and diamond shaped features in die bowl.

9. Top of crimp die shown in die bowl. Verify die sets correctly in die bowl!

ULTRA-FLEX™ HOSE ENDS WITH ULTRA-FLEX 650™ HOSE - (CONT'D)

10. Gently push down onto crimp die to insert and center die ring on top of crimp die below pusher. Verify that bottom of crimp die is seated correctly in die bowl. Prepare to install pusher onto crimper.

11. Insert and position the hose and fitting assembly into crimp from below. Verify that crimp collar seats correctly in crimp die.

12. While holding hose and fitting into position, begin pumping hand pump until die ring contacts crimper base plate. Release pressure by turning triangular knob on valve.

13. Remove hose and fitting assembly through bottom of die ring and inspect crimp on hose assembly.

14. Measure crimp diameter to ensure proper crimp diameter has been achieved. Refer to crimp chart dimension chart.

ULTRA-FLEX 650™ CRIMP DIMENSIONS

The target settings for the Earl's Ultra-Flex 650™ Kevlar & Stainless Steel covered hose, to be applied when using the Earl's Ultra-Flex Crimper and dies, are provided to aid in establishing actual diameters. While the Earl's Ultra-Flex crimper and dies for our Ultra-Flex hose will give crimp diameters close to, or at, specified diameters, the machine operator must check to verify actual dimensions.

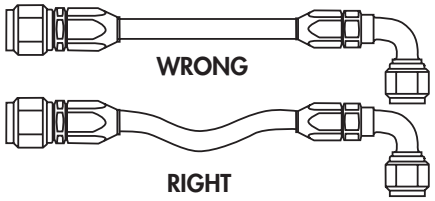
SIZE	Dia. after Crimp (in.)	Dia. After Crimp (mm)
-4	Ø 0.465 +/- .005	Ø11.81mm +/- .12mm
-6	Ø 0.606 +/- .005	Ø15.39mm +/- .12mm
-8	Ø 0.800 +/- .005	Ø20.32mm +/- .12mm
-10	Ø 0.930 +/- .005	Ø23.6mm +/- .12mm
-12	Ø 1.151 +/- .005	Ø29.23mm +/- .12mm
-16	Ø 1.345 +/- .005	Ø33.63mm +/- .12mm

Failure to follow these instructions could result in serious injury or property damage during crimping. Improperly crimped fittings can be dangerous to the user of the hose assembly.

- Do not crimp Earl's hose or fittings with another manufacturer's hose or fitting.
- These dimensions are for Earl's Ultra-Flex Kevlar & Stainless covered hose and Ultra-Flex hose ends only.
- Wear safety glasses and keep hands away from moving objects.
- Always check for proper crimping dimensions

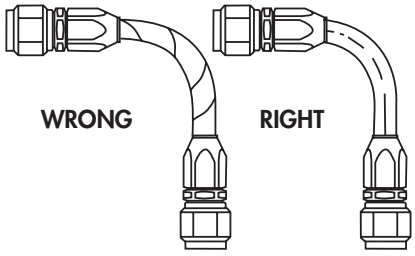
Always test assemblies for leakage prior to installation.

1. Provide for length change.



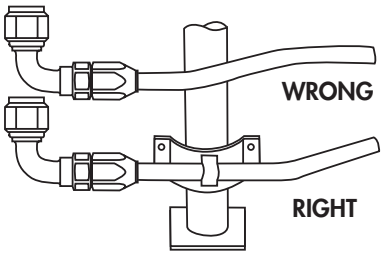
In straight hose installations, allow enough slack in the hose line to provide for changes in length that will occur when pressure is applied. This change in length can be from +2% to -4%.

2. Avoid twisting and orient properly.



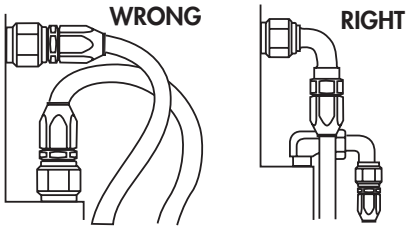
Do not twist during installation. This can be determined by the printed layline on the hose. Pressure applied to a twisted hose can cause hose failure or loosening of connections.

3. Protect from hazardous environment.



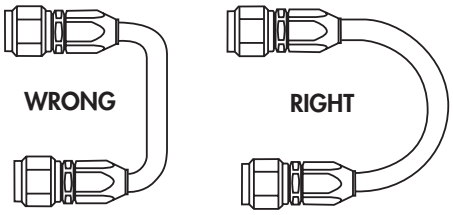
Keep hose away from hot parts. High ambient temperature will shorten hose life. If you can not route it away from heat source, insulate it.

4. Avoid mechanical strain.



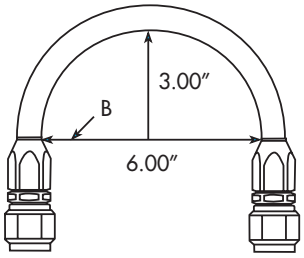
Use elbows and adapters in the installation to relieve strain on the assembly and to provide easier and neater installation that are accessible for inspection and maintenance.

5. Use proper bend radius.



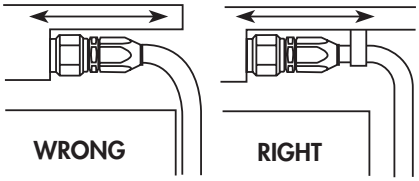
Keep the bend radius of the hose as large as possible to avoid collapsing of the hose and restriction of flow. Follow catalog specs on minimum bend radii.

6. Use proper bend radius (cont'd).



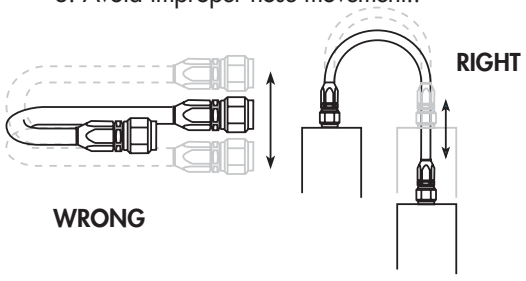
Minimum bend radius is measured on the inside bend of the hose. To determine minimum bend, divide the total distance between ends (B length) by 2. For example, B=6, minimum bend radius=3.

7. Secure for protection.



Install hose runs to avoid rubbing or abrasion. Use Earl's Hose Clamps to support long runs of hose or to keep away from moving parts. It is important that the clamps not allow the hose to move. This movement will cause abrasion and temperature hose failure.

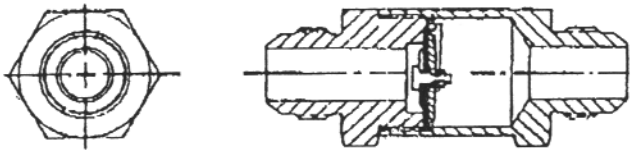
8. Avoid improper hose movement..



Make sure relative motion of the machine components produces bending rather than twisting of the hose. Hose should be routed so that the flex is in the same plane as the equipment movement.

FEATURES

ZERO LEAKAGE (Less Than 1 D.P.M.)
FULL FLOW with Low Opening Pressure



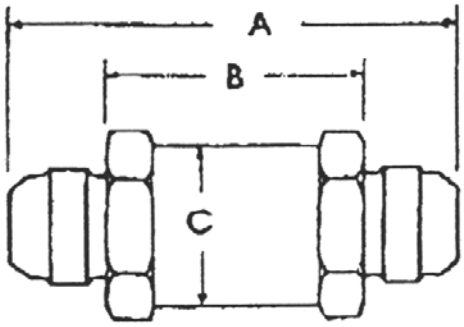
SPECIFICATIONS

Service Application: Water, Fuel, Oil
Temperature Range: -70 F to 350 F
Type of Port: Male 37 Flare with SAE thread

MATERIALS

Body and Cap: 6061 T6 Aluminum Alloy - Hard Anodized
Internal Parts: 6061 T6 Aluminum Alloy - Hard Anodized and Stainless Steel
Seal: Aluminum Crush Washer
Seat: Reinforced Viton®

Pressure Range: -6 to -12, 350 P.S.I.
Sizes: -4, -6, -8, -10, -12
Internal Leakage: .01 cc/min. Max
Mounting: Hinge Facing Up



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DuPont Performance Elastomers

Check Valves pg.37

PART NO.	SAE THREAD SIZE	TUBE SIZE	A + 0R -.005	B + OR - .005	C + OR - .005	HEX
253004ERL	7/16-20	1/4	2.375	1.270	.865	7/8
253006ERL	9/16-18	3/8	2.370	1.260	.865	7/8
253008ERL	3/4-16	1/2	2.645	1.335	.925	15/16
253010ERL	7/8-14	5/8	3.285	1.770	1.230	1-1/4
253012ERL	1-1/16-12	3/4	3.535	1.810	1.480	1-1/2

EARL'S HEAT EXCHANGER VALUES

BTU RATING/HOUR
0.55 GPM/TUBE @ 55MPH

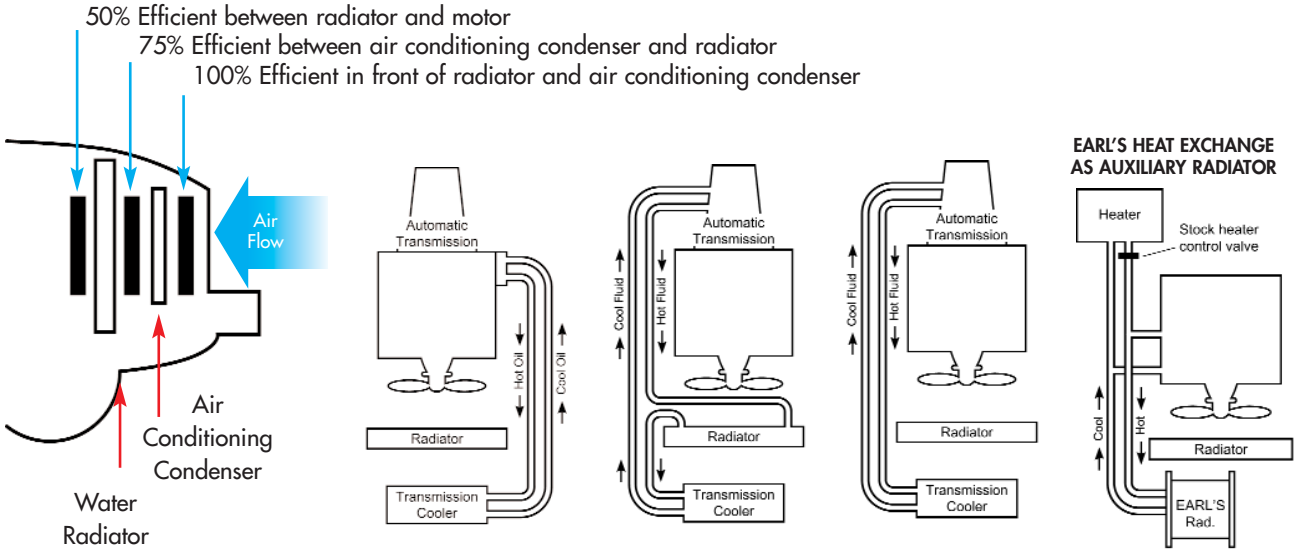
ROWS	Narrow Cooler P/N: 2XXXX 16 BTU/Min/Tube 960 BTU/HR	Wide Cooler P/N: 4XXXX 38 BTU/Min/Tube 2280 BTU/HR	Extra-Wide Cooler P/N: 8XXXX 49 BTU/Min/Tube 2940 BTU/HR
7	6720	15960	20508
10	9600	22800	29400
13	12480	29640	38220
16	15360	36480	47040
19	18240	43320	55860
25	24000	57000	73500
34	32640	74520	99960
42	40320	95760	123480
50	48000	114000	147000
60	57600	136800	176400

We tested our coolers against a leading tube & fin stack plate design on a high performance engine dyno. The test compared the pressure drop between the oil inlet and outlet of each cooler and the temperature drop during the test. The heat exchangers were plumbed with -10AN Pro-Lite 350™ hose to a Chevrolet 355 cubic inch Holley carbureted engine with headers. The test engine was mounted inside an engine dyno test cell. The tests were conducted with engine water temperature stabilized at 180º Fahrenheit and engine oil temperature stabilized at 227º Fahrenheit. Test cell ambient temperature was 94º Fahrenheit. All testing was done with engine speed at 2800 RPM. To simulate road speed, a cooling fan was erected to force air through the coolers at approximately 60ft/sec (41 mph).

Part #	41310	Tube/Fin
Surface Area(In^2)	34	67.5
Engine Water Temp. (Fº)	177	180
Oil Temp - In (Fº)	227	221
Oil Temp - Out (Fº)	207	203
Oil Temp Difference	**-20**	**-18**
Oil Pressure - In (PSI)	58.6	59
Oil Pressure - Out (PSI)	57.6	56
Oil Pressure Difference	**-1.0**	**-3.0**
Engine Speed (RPM)	2800	2800

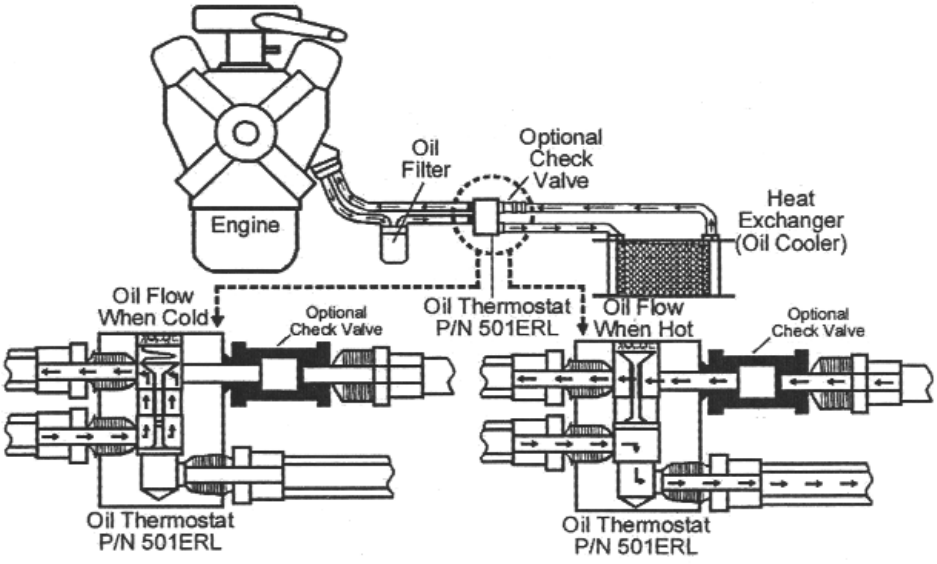
Conclusion:
Tube style & fin style cooler needed to be twice the size in surface area for the same heat rejection compared to the Earl's oil cooler.

TYPICAL PLUMBING OF COOLER

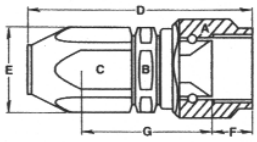


The outstanding heat transfer characteristic of our Tep-A-Cure™ Oil Coolers is achieved in part by using very thin aluminum sheets for the oil tubes. Every cooler is tested to 175 psi at our plant. Burst tests indicate pressures of up to 350 psi are tolerated before cooler failure.

Stomping on the accelerator while the engine is still cold with a sticky bypass valve on your engine can combine to create a pressure spike far exceeding 350 psi. If you can't break the "throttle stomping while the engine is still cold" habit, you must install a check valve (FCV) and a thermostat (P/N 501ERL) in your oil system, as shown in the diagram.



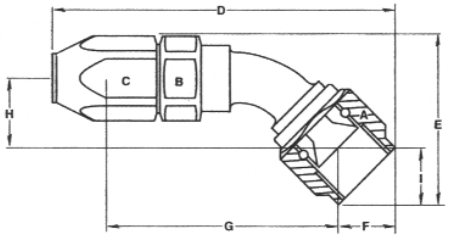
1. Place the flapper Check Valve (FCV) in the return line **FROM** the cooler **TO** the thermostat.
2. The direction of free flow through the FCV **MUST** be **towards** the thermostat.
3. See the drawing for the location of the thermostat. The port marked "INLET" on the thermostat is the inlet from the engine. Be sure to plumb the thermostat according to the drawing



Straight Aluminum Auto-Fit Hose End

3001

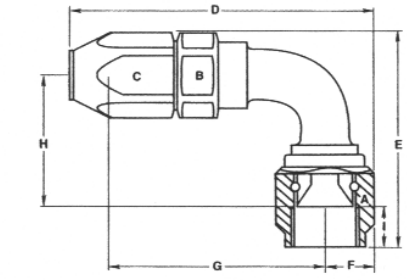
3001		04	06	08	10	12	16	20	24
NUT HEX	A	9/16	11/16	7/8	1	1 1/4	1 1/2	2	2 1/4
BODY HEX	B	9/16	11/16	7/8	1	1 1/4	1 1/2	2	2 1/4
SOCKET HEX	C	5/8	3/4	7/8	1 1/16	1 3/16	1 7/16	1 3/4	1 15/16
.O.A. LENGTH	D	1 5/8	1 7/8	2 3/16	2 3/8	2 1/2	2 7/8	3 3/16	3 7/8
WIDTH (MAX)	E	23 /32	7/8	1 1/32	1 7/32	1 7/16	1 3/4	2 5/16	2 19/32
FLARE TO END	F	11/32	3/8	7/16	1/2	17/32	5/8	11/16	13/16
CUT-OFF	G	7/8	15/16	1 1/8	1 1/4	1 5/16	15/16	1 9/16	1 5/8
OPERATING P.S.I.		1500	1500	1500	1250	1000	750	500	250
BURST EXCEEDS		6000	6000	6000	5000	4000	3000	2000	1000



45° Tubular Auto-Fit Hose End

3046

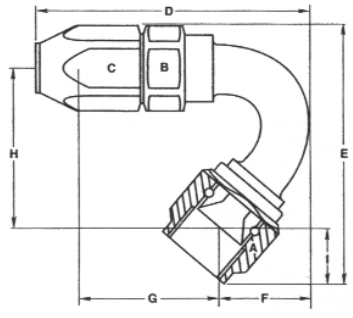
6150		4	6	8	10	12	16	20	24
NUT HEX	A	9/16	11/16	7/8	1	1 1/4	1 1/2	2	2 1/4
BODY HEX	B	9/16	11/16	7/8	1	1 1/4	1 1/2	1 3/4	2
SOCKET HEX	C	5/8	3/4	7/8	1 1/16	1 3/16	1 7/16	1 3/4	1 15/16
.O.A. LENGTH	D	2 1/8	2 17/32	2 29/32	3 5/32	3 7/16	4 1/8	4 3/4	5 1/4
WIDTH (MAX)	E	1 1/8	1 5/16	1 23/32	1 15/16	2 3/16	2 1/2	2 15/16	3 7/16
FLARE TO END	F	7/16	17/32	9/16	21/32	3/4	15/16	1 3/16	1 7/16
CUT-OFF	G	1 9/32	1 7/16	1 5/8	1 7/8	2 1/16	2 5/16	2 3/4	3
C.L. TO FLARE	H	11/32	7/16	9/16	5/8	23/32	11/16	13/16	31/32
EDGE TO FLARE	I	7/16	1/2	19/32	23/32	13/16	1 1/32	1 3/16	1 1/4
OPERATING P.S.I.		1500	1500	1500	1250	1000	750	500	250
BURST EXCEEDS		6000	6000	6000	5000	4000	3000	2000	1000



90° Tubular Auto-Fit Hose End

3091

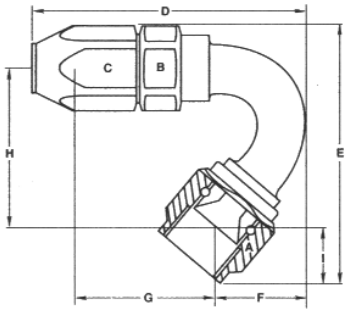
3091		4	6	8	10	12	16	20	24
NUT HEX	A	9/16	11/16	7/8	1	1 1/4	1 1/2	2	2 1/4
BODY HEX	B	9/16	11/16	7/8	1	1 1/2	1 1/2	1 3/4	2
SOCKET HEX	C	5/8	3/4	7/8	1 1/16	1 3/16	1 7/16	1 3/4	1 15/16
.O.A. LENGTH	D	1 13/16	2 11/32	2 1/2	2 3/4	3 3/16	3 7/8	4 5/8	5
WIDTH (MAX)	E	1 5/8	1 13/16	2	2 1/4	2 5/8	3 1/8	3 5/8	4 1/16
FLARE TO END	F	11/32	13/32	1/2	9/16	23/32	7/8	1 5/32	1 5/16
CUT-OFF	G	1 1/16	1 5/16	1 3/8	1 9/16	1 13/16	2 3/16	2 5/8	2 3/4
C.L. TO FLARE	H	13/16	1 1/32	1 1/16	1 5/32	1 7/16	111/16	2 3/32	2 9/32
EDGE TO FLARE	I	11/32	3/8	7/16	1/2	1/2	11/16	11/16	13/16
OPERATING P.S.I.		1500	1500	1500	1250	1000	750	500	250
BURST EXCEEDS		6000	6000	6000	5000	4000	3000	2000	1000



120° Tubular Auto-Fit Hose End

3120

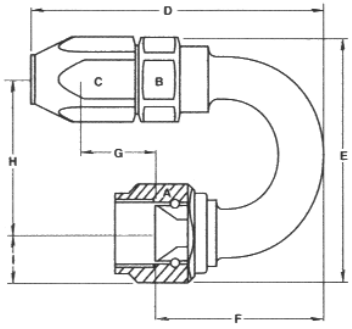
3091		4	6	8	10	12	16
NUT HEX	A	9/16	11/16	7/8	1	1 1/4	1 1/2
BODY HEX	B	9/16	11/16	7/8	1	1 1/2	1 1/2
SOCKET HEX	C	5/8	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	1 21/32	1 15/16	2 7/32	2 1/2	2 3/4	3 7/16
WIDTH (MAX)	E	1 15/16	2 1/16	2 5/16	2 25/32	3 1/8	3 11/16
FLARE TO END	F	7/16	17/32	5/8	11/16	13/16	15/16
CUT-OFF	G	15/16	1 5/16	1 3/8	1 9/16	1 13/16	2 3/16
C.L. TO FLARE	H	13/16	13/16	1 1/16	1 1/4	1 5/16	1 5/8
EDGE TO FLARE	I	1/2	1/2	9/32	11/16	3/4	15/16
OPERATING P.S.I.		1500	1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	6000	5000	4000	3000



150° Tubular Auto-Fit Hose End

3150

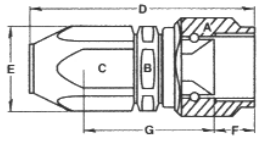
3150		4	6	8	10	12	16
NUT HEX	A	9/16	11/16	7/8	1	1 1/4	1 1/2
BODY HEX	B	9/16	11/16	7/8	1	1 1/2	1 1/2
SOCKET HEX	C	5/8	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	1 5/8	1 31/32	2 11/32	2 5/8	2 15/16	3 9/16
WIDTH (MAX)	E	1 7/8	2 3/32	2 1/2	3	3 5/8	4 5/16
FLARE TO END	F	13/16	13/32	1 1/8	11/4	1 11/16	1 1/2
CUT-OFF	G	7/16	5/8	3/4	13/16	3/4	1
C.L. TO FLARE	H	1 1/8	13/16	1 15/32	1 3/4	2 5/32	2 1/2
EDGE TO FLARE	I	13/32	1/2	9/16	21/32	13/16	1
OPERATING P.S.I.		1500	1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	6000	5000	4000	3000



180° Tubular Auto-Fit Hose End

3180

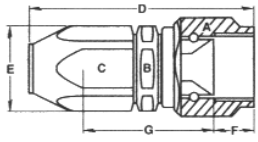
3180		4	6	8	10	12	16
NUT HEX	A	9/16	11/16	7/8	1	1 1/4	1 1/2
BODY HEX	B	9/16	11/16	7/8	1	1 1/2	1 1/2
SOCKET HEX	C	5/8	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	1 3/4	2 1/4	2 17/32	2 7/8	3 1/2	4
WIDTH (MAX)	E	1 13/16	2 5/16	2 17/32	3 3/16	4 7/16	4 11/16
FLARE TO END	F	1 7/32	1 7/16	1 5/8	115/16	2 9/16	2 5/8
CUT-OFF	G	5/16	5/16	3/8	11/32	7/16	1/2
C.L. TO FLARE	H	1 1/8	1 1/2	1 1/2	2	3	3
EDGE TO FLARE	I	11/32	13/32	1/2	9/16	23/32	7/8
OPERATING P.S.I.		1500	1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	6000	5000	4000	3000



Straight Speed Seal Hose End

6001

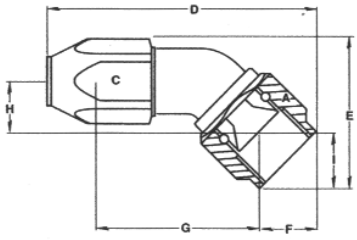
6001		03	33	93	43	04	34	94
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16	9/16
BODY HEX	B	1/2	1/2	1/2	9/16	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	1 3/8	1 3/8	1 3/8	1 13/32	1 9/16	1 9/16	1 9/16
WIDTH (MAX)	E	37/64	37/64	37/64	21/32	21/32	11/16	21/32
FLARE TO END	F	5/16	5/16	5/16	11/32	11/32	11/32	11/32
CUT-OFF	G	23/32	23/32	23/32	3/4	25/32	25/32	25/32
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	8000	8000	8000



Straight Speed Seal Hose End

6001

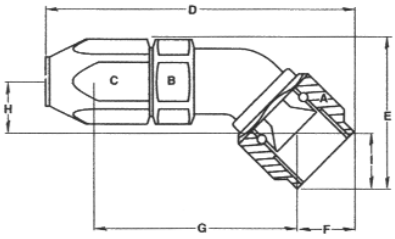
6001		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
BODY HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	1 23/32	1 23/32	1 23/32	2
WIDTH (MAX)	E	51/64	7/8	51/64	1 1/64
FLARE TO END	F	3/8	3/8	3/8	7/16
CUT-OFF	G	27/32	27/32	27/32	15/16
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



45° Non-Adjustable Low Profile Speed Seal Hose End

6044

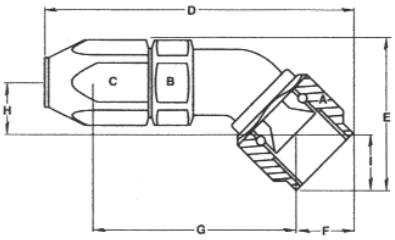
6044		03	04
NUT HEX	A	1/2	9/16
SOCKET HEX	C	7/16	9/16
.O.A. LENGTH	D	1 5/8	1 3/4
WIDTH (MAX)	E	15/16	1 1/16
FLARE TO END	F	7/16	7/16
CUT-OFF	G	7/8	15/16
C.L. TO FLARE	H	5/16	5/16
EDGE TO FLARE	I	7/16	7/16
OPERATING P.S.I.		2000	2000
BURST EXCEEDS		8000	8000



45° Adjustable Low Profile Speed Seal Hose End

6045

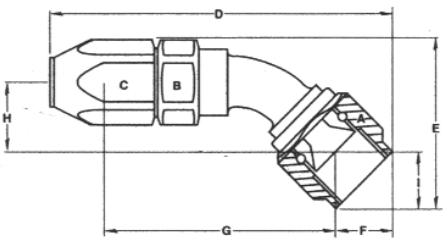
6045		03	33	93	04	34	94
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16
SWIVEL HEX	B	1/2	1/2	1/2	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	1 7/8	1 7/8	1 7/8	2 1/32	2 1/32	2 1/32
WIDTH (MAX)	E	1	1 1/32	1	1 1/16	1 1/32	1 1/16
FLARE TO END	F	7/16	7/16	7/16	15/32	15/32	15/32
CUT-OFF	G	1 1/8	1 1/8	1 1/8	1 5/32	1 5/32	1 5/32
C.L. TO FLARE	H	1/4	1/4	1/4	5/16	5/16	5/16
EDGE TO FLARE	I	7/16	7/16	7/16	15/32	15/32	15/32
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	6000	6000



45° Adjustable Low Profile Speed Seal Hose End

6045

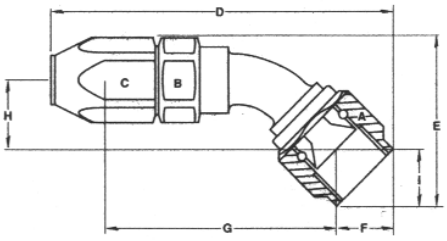
6045		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
SWIVEL HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	2 7/32	2 7/32	2 7/32	2 11/16
WIDTH (MAX)	E	1 9/32	1 5/16	1 9/32	1 5/8
FLARE TO END	F	17/32	17/32	17/32	9/16
CUT-OFF	G	1 9/32	1 9/32	1 9/32	1 9/16
C.L. TO FLARE	H	3/8	3/8	3/8	9/16
EDGE TO FLARE	I	1/2	1/2	1/2	19/32
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



45° Tubular Non-Adjustable Speed Seal Hose End

6046

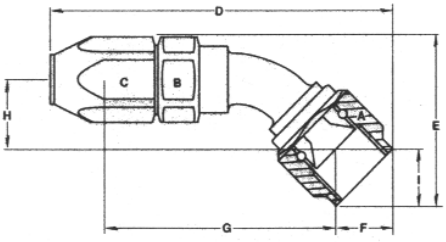
6046		03	33	04	34
NUT HEX	A	1/2	1/2	9/16	9/16
BODY HEX	B	1/2	1/2	9/16	9/16
SOCKET HEX	C	7/16	1/2	9/16	5/8
.O.A. LENGTH	D	1 15/16	1 15/16	2	2
WIDTH (MAX)	E	1 1/8	1 1/8	1 1/8	1 1/8
FLARE TO END	F	7/16	7/16	7/16	7/16
CUT-OFF	G	11/4	1 1/4	11/4	1 1/4
C.L. TO FLARE	H	5/16	5/16	5/16	5/16
EDGE TO FLARE	I	7/16	7/16	7/16	7/16
OPERATING P.S.I.		2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000



45° Tubular Adjustable Speed Seal Hose End

6047

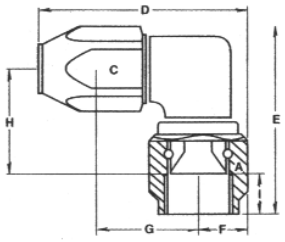
6047		03	33	93	04	34	94
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16
SWIVEL HEX	B	1/2	1/2	1/2	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	2 1/16	2 1/16	2 1/16	2 3/16	2 3/16	2 3/16
WIDTH (MAX)	E	1 1/16	1 1/16	1 1/16	1 3/16	1 7/32	1 3/16
FLARE TO END	F	7/16	7/16	7/16	15/32	15/32	15/32
CUT-OFF	G	1 5/16	1 5/16	1 5/16	1 11/32	1 11/32	1 11/32
C.L. TO FLARE	H	5/16	5/16	5/16	11/32	11/32	11/32
EDGE TO FLARE	I	7/16	7/16	7/16	15/32	15/32	15/32
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	8000	8000



45° Tubular Adjustable Speed Seal Hose End

6047

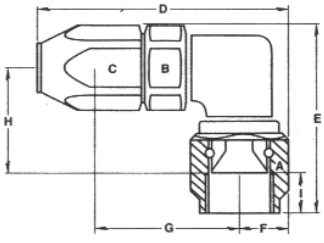
6047		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
SWIVEL HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	2 5/8	2 19/32	2 5/8	2 15/16
WIDTH (MAX)	E	1 3/8	1 5/16	1 3/8	1 23/32
FLARE TO END	F	17/32	17/32	17/32	9/16
CUT-OFF	G	1 21/32	1 5/8	1 21/32	1 3/4
C.L. TO FLARE	H	17/32	7/16	17/32	9/16
EDGE TO FLARE	I	17/32	17/32	17/32	9/16
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



90° Low Profile Non-Adjustable Speed Seal Hose End

6089

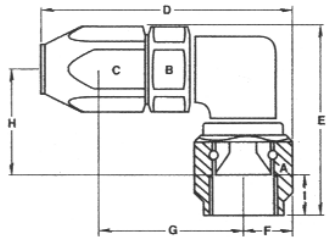
6089		03	04
NUT HEX	A	1/2	9/16
SOCKET HEX	C	7/16	9/16
.O.A. LENGTH	D	1 13/32	1 1/2
WIDTH (MAX)	E	1 17/32	1 9/32
FLARE TO END	F	9/32	11/32
CUT-OFF	G	11/16	11/16
C.L. TO FLARE	H	19/32	5/8
EDGE TO FLARE	I	11/32	11/32
OPERATING P.S.I.		2000	2000
BURST EXCEEDS		8000	8000



90° Low Profile Adjustable Speed Seal Hose End

6090

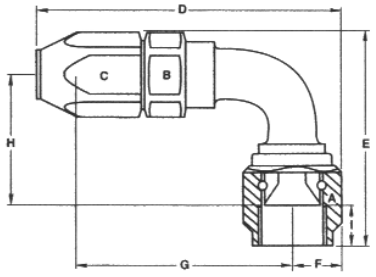
6090		03	33	93	04	34	94
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16
SWIVEL HEX	B	1/2	1/2	1/2	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	1 17/32	1 17/32	1 17/32	1 23/32	1 23/32	1 23/32
WIDTH (MAX)	E	1 7/32	1 7/32	1 7/32	1 9/32	1 11/32	1 9/32
FLARE TO END	F	7/32	9/32	9/32	11/32	11/32	11/32
CUT-OFF	G	15/16	15/16	15/16	29/32	29/32	29/32
C.L. TO FLARE	H	19/32	19/32	19/32	5/8	5/8	5/8
EDGE TO FLARE	I	11/32	11/32	11/32	11/32	11/32	11/32
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	8000	8000



90° Low Profile Adjustable Speed Seal Hose End

6090

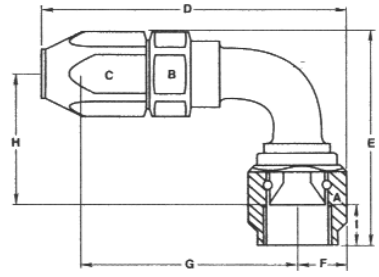
6090		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
SWIVEL HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	1 15/16	1 15/16	1 15/16	2 11/32
WIDTH (MAX)	E	1 9/16	1 9/16	1 9/16	1 7/8
FLARE TO END	F	13/32	13/32	13/32	1/2
CUT-OFF	G	1	1	1	1 1/4
C.L. TO FLARE	H	3/4	3/4	3/4	15/16
EDGE TO FLARE	I	3/8	3/8	3/8	7/16
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



90° Non-Adjustable Speed Seal Hose End

6091

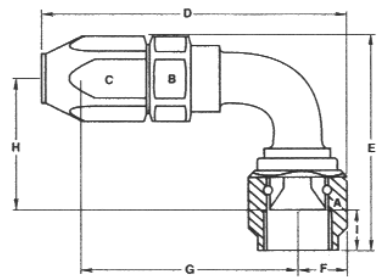
6091		03	33	04	34
NUT HEX	A	1/2	1/2	9/16	9/16
BODY HEX	B	1/2	1/2	9/16	9/16
SOCKET HEX	C	7/16	1/2	9/16	5/8
.O.A. LENGTH	D	1 9/16	1 9/16	1 13/16	1 13/16
WIDTH (MAX)	E	1 5/16	1 3/8	1 9/16	1 5/8
FLARE TO END	F	9/32	9/32	5/16	5/16
CUT-OFF	G	7/8	7/8	1 1/8	1 1/8
C.L. TO FLARE	H	11/16	11/16	13/16	13/16
EDGE TO FLARE	I	11/32	11/32	11/32	11/32
OPERATING P.S.I.		2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000



90° Tubular Adjustable Speed Seal Hose End

6092

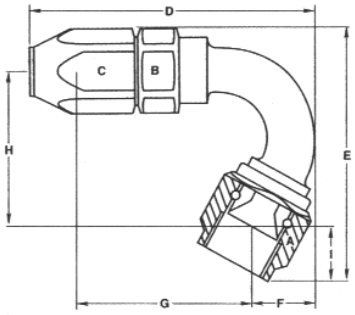
6092		03	33	93	04	34	94
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16
SWIVEL HEX	B	1/2	1/2	1/2	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	1 3/4	1 13/16	1 3/4	2	2	2
WIDTH (MAX)	E	1 7/16	1 1/2	1 17/16	1 19/32	1 17/32	1 19/32
FLARE TO END	F	9/32	9/32	9/32	11/32	3/8	11/32
CUT-OFF	G	1 3/16	1 1/4	1 3/16	1 7/32	1 7/32	1 7/32
C.L. TO FLARE	H	13/16	7/8	13/16	1	7/8	1
EDGE TO FLARE	I	11/32	11/32	11/32	11/32	11/32	11/32
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	8000	8000



90° Tubular Adjustable Speed Seal Hose End

6092

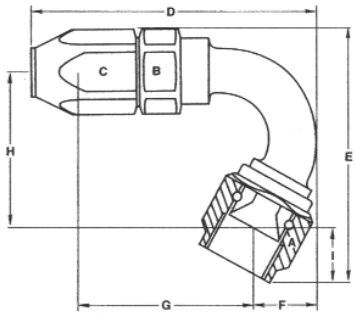
6092		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
SWIVEL HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	2 13/32	2 5/16	2 13/32	2 19/32
WIDTH (MAX)	E	1 15/16	1 13/16	1 15/16	1 3132
FLARE TO END	F	7/32	9/32	9/32	1/2
CUT-OFF	G	15/16	15/16	15/16	1 1/2
C.L. TO FLARE	H	1 1/8	1 1/32	1 1/8	1 1/16
EDGE TO FLARE	I	3/8	3/8	3/8	7/16
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



120° Tubular Adjustable Speed Seal Hose End

6121

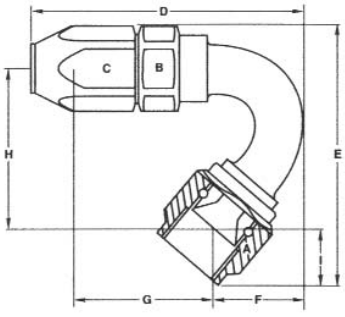
6121		03	33	93	04	34	94
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16
SWIVEL HEX	B	1/2	1/2	1/2	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	1 1/2	1 23/32	1/2	1 15/16	1 7/8	1 15/16
WIDTH (MAX)	E	1 19/32	1 7/8	1 17/32	1 7/8	1 15/16	1 7/8
FLARE TO END	F	13/32	1/2	13/32	17/32	17/32	17/32
CUT-OFF	G	13/16	1 1/16	13/16	1 5/32	1 1/16	1 5/32
C.L. TO FLARE	H	7/8	1 1/16	7/8	1 1/8	1 1/8	1 1/8
EDGE TO FLARE	I	3/8	3/8	3/8	1/2	1/2	1/2
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	8000	8000



120° Tubular Adjustable Speed Seal Hose End

6121

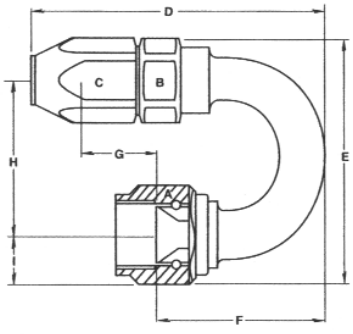
6121		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
SWIVEL HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	1 1/2	1 23/32	1/2	1 7/8
WIDTH (MAX)	E	2 1/4	2 1/32	2 1/4	2 5/16
FLARE TO END	F	17/32	17/32	17/32	5/8
CUT-OFF	G	1 1/16	1 1/8	1 1/16	1 7/32
C.L. TO FLARE	H	1 1/8	1 1/8	1 1/8	1 1/4
EDGE TO FLARE	I	1/2	1/2	1/2	19/32
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



150° Tubular Adjustable Speed Seal Hose End

6151

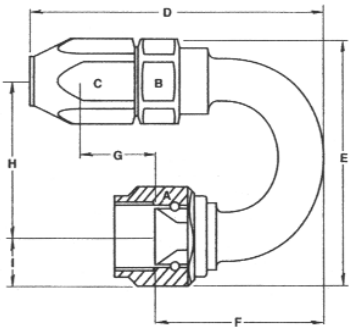
6151		38
NUT HEX	A	7/8
SWIVEL HEX	B	7/8
SOCKET HEX	C	7/8
.O.A. LENGTH	D	2 1/2
WIDTH (MAX)	E	2 1/8
FLARE TO END	F	1 1/8
CUT-OFF	G	3/4
C.L. TO FLARE	H	1 7/16
EDGE TO FLARE	I	9/16
OPERATING P.S.I.		1000
BURST EXCEEDS		4000



180° Tubular Adjustable Speed Seal Hose End

6181

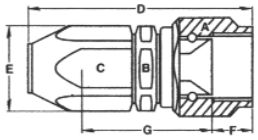
6181		03	33	04	34	06	36
NUT HEX	A	1/2	1/2	1/2	9/16	9/16	9/16
SWIVEL HEX	B	1/2	1/2	1/2	9/16	9/16	9/16
SOCKET HEX	C	7/16	1/2	7/16	9/16	5/8	9/16
.O.A. LENGTH	D	1 11/16	1 7/8	1 11/16	2	2	2
WIDTH (MAX)	E	1 9/16	1 11/16	1 9/16	1 1/8	1 1/8	1 1/8
FLARE TO END	F	1	1 1/8	1	1 1/8	1 1/8	1 1/8
CUT-OFF	G	5/16	7/16	5/16	7/16	7/16	7/16
C.L. TO FLARE	H	1	1 1/8	1	1 1/8	1 1/8	1 1/8
EDGE TO FLARE	I	9/32	9/32	9/32	11/32	11/32	11/32
OPERATING P.S.I.		2000	2000	2000	2000	2000	2000
BURST EXCEEDS		8000	8000	8000	8000	8000	8000



180° Tubular Adjustable Speed Seal Hose End

6181

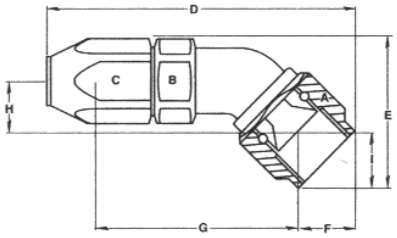
6181		06	36	96	38
NUT HEX	A	11/16	11/16	11/16	7/8
SWIVEL HEX	B	11/16	11/16	11/16	7/8
SOCKET HEX	C	11/16	3/4	11/16	7/8
.O.A. LENGTH	D	2 11/32	2 11/32	2 11/32	2 5/8
WIDTH (MAX)	E	2 5/16	2 11/32	2 5/16	2 17/32
FLARE TO END	F	1 7/16	1 7/16	1 7/16	1 5/8
CUT-OFF	G	15/32	15/32	15/32	1/2
C.L. TO FLARE	H	1 1/2	1 1/2	1 1/2	1 1/2
EDGE TO FLARE	I	13/32	13/32	13/32	1/2
OPERATING P.S.I.		1500	1500	1500	1000
BURST EXCEEDS		6000	6000	6000	4000



Straight Swivel Seal Hose End

8001

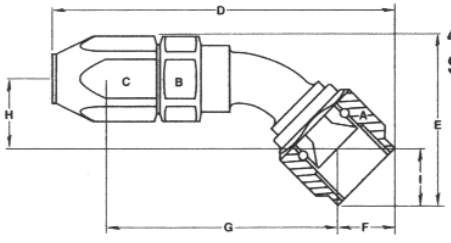
8001		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	11/16	7/8	1	1 1/4	1 1/2
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	1 25/32	2 3/16	2 7/16	2 1/2	2 15/16
WIDTH (MAX)	E	7/8	1 1/32	1 7/32	1 7/16	1 3/4
FLARE TO END	F	3/8	7/16	1/2	17/32	1/2
CUT-OFF	G	15/16	1 3/16	1 5/16	1 5/16	1 9/16
OPERATING P.S.I.		1500	1500	11250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000



45° Low Profile Swivel Seal Hose End

8045

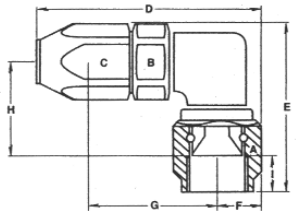
8045		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 1/2
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	2 1/2	3 1/32	3 5/16	3 11/16	4 1/4
WIDTH (MAX)	E	1 5/16	1 5/8	1 13/16	2 3/16	2 1/2
FLARE TO END	F	17/32	9/16	21/32	3/4	15/16
CUT-OFF	G	1 1/2	1 13/16	1 15/16	2 7/32	2 1/2
C.L. TO FLARE	H	3/8	9/16	9/16	23/32	11/16
EDGE TO FLARE	I	1/2	19/32	23/32	13/16	1 1/32
OPERATING P.S.I.		1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000



45° Tubular Swivel Seal Hose End

8046

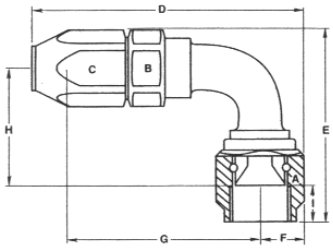
8046		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 5/16
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	2 7/8	3 3/16	3 1/2	4	4 3/8
WIDTH (MAX)	E	1 5/16	1 23/32	1 15/16	2 3/16	2 1/2
FLARE TO END	F	17/32	9/16	21/32	3/4	15/16
CUT-OFF	G	1 15/16	2 1/8	2 3/16	2 5/8	2 3/4
C.L. TO FLARE	H	7/16	9/16	5/8	23/32	11/16
EDGE TO FLARE	I	1/2	19/32	23/32	13/16	1 1/32
OPERATING P.S.I.		1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000



90° Low Profile Swivel Seal Hose End

8090

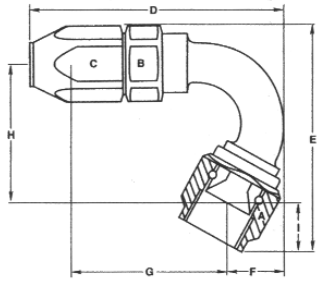
8090		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 5/16
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	2 1/8	2 1/2	2 13/16	3 5/16	3 45/64
WIDTH (MAX)	E	1 9/16	1 7/8	2 3/16	2 9/16	2 47/64
FLARE TO END	F	13/32	1/2	9/16	23/32	27/32
CUT-OFF	G	1 5/16	1 3/8	1 9/16	1 7/8	2 1/8
C.L. TO FLARE	H	3/4	15/16	1 1/16	1 3/8	5/8
EDGE TO FLARE	I	3/8	7/16	1/2	1/2	11/16
OPERATING P.S.I.		1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000



90° Tubular Swivel Seal Hose End

8091

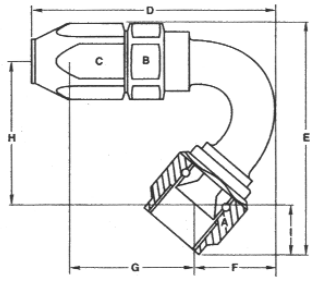
8091		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 5/16
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	2 7/16	2 25/32	3 1/8	3 5/8	4 3/16
WIDTH(MAX)	E	1 13/16	2	2 1/4	2 5/8	3 1/8
FLARE TO END	F	13/32	1/2	9/16	25/32	7/8
CUT-OFF	G	1 5/8	1 3/4	1 15/16	2 1/4	2 5/8
C.L. TO FLARE	H	1 1/32	1 1/16	1 5/32	1 7/16	1 11/16
EDGE TO FLARE	I	3/8	7/16	1/2	1/2	11/16
OPERATING P.S.I.		1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000



120° Tubular Swivel Seal Hose End

8120

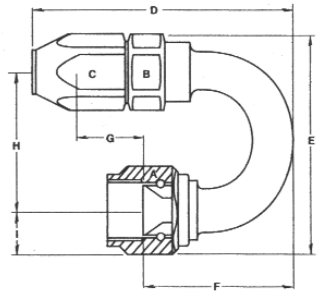
8120		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 5/16
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	2 3/16	2 17/32	2 27/32	3 3/16	3 3/4
WIDTH (MAX)	E	2 1/16	2 5/16	2 25/32	3 1/8	3 11/16
FLARE TO END	F	17/32	5/8	11/16	13/16	15/16
CUT-OFF	G	1 5/16	1 3/8	1 1/2	1 3/4	2 1/8
C.L. TO FLARE	H	1 1/8	1 1/4	1 17/32	1 13/16	2 1/32
EDGE TO FLARE	I	1/2	19/32	11/16	3/4	15/16
OPERATING P.S.I.		2000	2000			
BURST EXCEEDS		6000	6000			



150° Tubular Swivel Seal Hose End

8150

8150		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 5/16
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	2 1/4	2 5/8	2 15/16	3 7/16	3 15/16
WIDTH(MAX)	E	2 3/32	2 1/2	3	3 5/8	4 5/16
FLARE TO END	F	13/16	1 1/8	1 1/4	1 11/32	1 1/2
CUT-OFF	G	7/8	1	1 1/8	1 3/8	1 21/32
C.L. TO FLARE	H	1 3/16	1 15/32	1 3/4	2 5/32	2 1/2
EDGE TO FLARE	I	1/2	9/16	21/32	13/16	1
OPERATING P.S.I.		1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000



180° Tubular Swivel Seal

8180

8180		06	08	10	12	16
NUT HEX	A	11/16	7/8	1	1 1/4	1 1/2
CUTTER HEX	B	5/8	13/16	15/16	1 1/16	1 5/16
SOCKET HEX	C	3/4	7/8	1 1/16	1 3/16	1 7/16
.O.A. LENGTH	D	1 1/2	2 7/8	3 1/4	3 15/16	4 3/8
WIDTH (MAX)	E	1 5/16	2 17/32	3 3/16	4 7/16	4 11/16
FLARE TO END	F	1 7/16	1 5/8	1 15/16	2 9/16	2 5/8
CUT-OFF	G	21/32	3/4	23/32	3/4	1
C.L. TO FLARE	H	1 1/2	1 1/2	2	3	3
EDGE TO FLARE	I	13/32	1/2	9/16	23/32	7/8
OPERATING P.S.I.		1500	1500	1250	1000	750
BURST EXCEEDS		6000	6000	5000	4000	3000