CBC-LOK®

CS-LOK®

TUBE FITTINGS

MADE IN THE U.S.A.

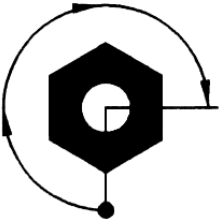
CBC-LOK®/CS-LOK® INSTALLATION INSTRUCTIONS

CBC-Lok®/CS-Lok® Tube Fittings come completely assembled and ready for use, no dissassemby required. Although there are some general guide lines to follow, no special preparation of the tubing is necessary. In overhead applications, Tylok recommends using a Pre-Set Tool.

SIZE		TIGHTEN # TURN(S)
1	1/16”	3/4
2	1/8”	
3	3/16”	
4	1/4”	1-1/4
5	5/16”	
6	3/8”	
8	1/2”	
10	5/8”	
12	3/4”	
14	7/8”	
16	1”	

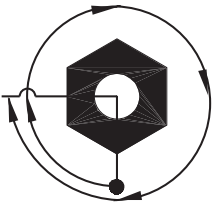
NOTE: DF Plugs, -NF (Nut & Ferrule Pre-Assembles) require only 1/4 turn make-up.

Size #1 thru #3

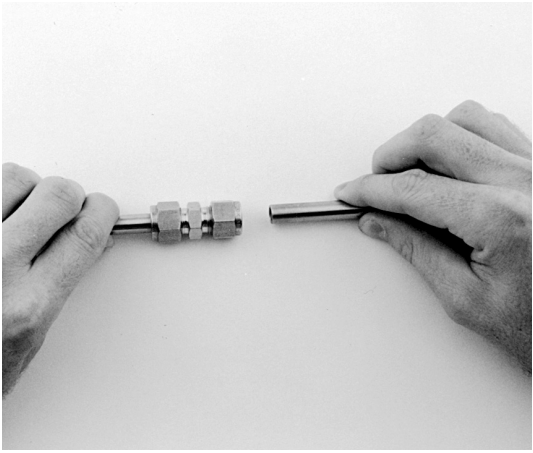


Finger tight plus 3/4 turn

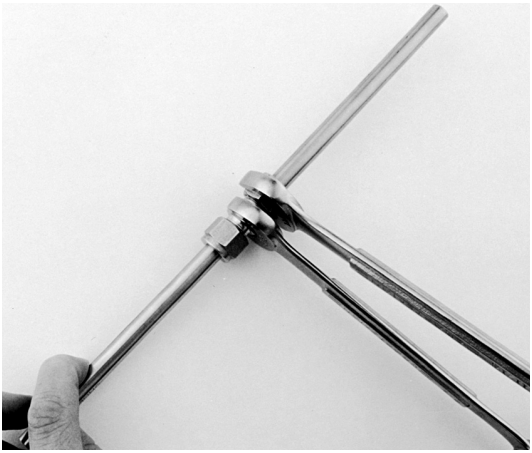
Size #4 thru #16



Finger tight plus 1-1/4 turn



Simply insert the tubing into the assembly, making sure the tubing seats firmly against the shoulder of the body and the nut is finger tight. **High pressure applications and high safety-factor systems:** Further tighten the nut until the tube will not turn by hand or move axially in the fitting.



Tighten nut with wrench the additional number of turns indicated above, while holding the fitting body with a second wrench.

CBC-LOK® TUBING SELECTION & PREPARATION

Proper selection of tubing is key to the performance of the fitting. When selecting the proper wall thickness and material, all tubing should be compatible with the process fluid, temperature, application, flow and system pressure.

For proper sealing it is recommended that the tubing and fitting be of like material to allow for positive sealing (i.e., stainless on stainless, brass on copper, steel on steel). Galvanic corrosion could occur if the tubing and fitting are not of like material, with the exception of a brass fitting on copper tubing.

When using stainless steel tubing, Tylok recommends using Type 304 or 316 fully annealed, seamless or welded redrawn meeting ASTM A213, ASTM A269 or equivalent, with a suggested maximum hardness of 80 Rb.

For copper tubing, Tylok suggests using soft annealed, seamless tubing per ASTM B75 or equivalent. Copper water tube type K or L, soft annealed (Temper O) per ASTM B88 can also be used.

When using carbon steel, all tubing should be fully annealed and conform to ASTM A179, or equivalent, with a maximum hardness of 72 Rb.

In general, all tubing should be free of nicks, scratches, or imperfections of any kind and should be suitable for bending. Out of round tubing that does not easily go through fitting components should not be used. It is recommended that the charts be used for tube selection. Ideally, the tube end should be cut square so that when it bottoms out inside the fitting, an extra seal is provided. Avoid installing contaminated tubing into your system. For elevated temperatures, see Tube Pressure Derating Factors at Elevated Temperatures Chart.

CBC-Lok®/CS-Lok®Tube Fittings swage the tubing to achieve sealing. Thin wall tubing (wall thicknesses with working pressures highlighted in reverse text in the charts) is not recommended for Gas Service. See “Gas Service” on page 58.

When using tubing of a thinner or thicker wall than shown, it is always recommended that you consult with your local Distributor or contact Tylok International directly if there is any doubt selecting tubing.

It is the responsibility of the Engineer to refer to the technical pages in this catalog to ensure selection of the proper tubing material, tubing compatibility with the fitting, media and tubing wall thickness.

Values in reverse text are not recommended for Gas Service.

Note: Tables, calculated to the right, are suggested maximum working pressure ratings, in accordance with ASME B31.3, but should be used for reference only. Tylok International, Inc., is not responsible for its accuracy nor designs using these figures.

Following the stated recommendations will result in a safe application, free of leaks. The entire system must be considered when selecting the tube. Tylok tube fittings are designed to work to the tubing pressure ratings found in the charts below.

SUGGESTED ALLOWABLE WORKING PRESSURE TABLES (psig)

STAINLESS STEEL

Tube Size	Tube Wall Thickness (inches)							
O.D.	.028	.035	.049	.065	.083	.095	.109	.120
1/8"	8500	10900						
3/16"	5400	7000	10200					
1/4"	4000	5100	7500	10200				
5/16"		4000	5800	8000				
3/8"		3300	4800	6500				
1/2"		**2600**	3700	5100	6700			
5/8"			**2900**	4000	5200	6000		
3/4"			**2400**	3300	4200	4900	5800	
7/8"			**2000**	**2800**	3600	4200	4800	
1"				**2400**	3100	3600	4200	4700

75,000 PSI Tensile

Note: For welded and drawn tubing, a derating factor must be utilized.For double welded tube, multiply the above pressure rating by .85; and for single welded tube by .80 ANSI B31.

CARBON STEEL

Tube Size	Tube Wall Thickness (inches)							
O.D.	.028	.035	.049	.065	.083	.095	.109	.120
1/8"	8000	10200						
3/16"	5100	6000	9600					
1/4"	3700	4800	7000	9600				
5/16"		3800	5500	7600				
3/8"		3100	4500	6200				
1/2"		**2200**	3200	4400	5900			
5/8"			**2500**	3500	4600	5300		
3/4"			**2100**	2800	3700	4300	5100	
7/8"			**1800**	**2400**	3100	3700	4300	
1"				**2100**	2700	3200	3700	4100

COPPER

Tube Size	Tube Wall Thickness (inches)							
O.D.	.028	.035	.049	.065	.083	.095	.109	.120
1/8"	2700	3600						
3/16"	1800	2300	3400					
1/4"	1300	1600	2500	3500				
5/16"		1300	1900	2700				
3/8"		1000	1600	2200				
1/2"		**800**	1100	1600	2100			
5/8"			**900**	1200	1600	1900		
3/4"			**700**	1000	1300	1500	1800	
7/8"			**600**	**800**	1100	1300	1500	
1"			**500**	**700**		1100	1300	1500

GAS SERVICE

Extra care must be taken when tubing is used in gas service applications. Small gas molecules easily escape through minute leak paths; therefore, the tubing must be free of nicks, scratches and imperfections of any kind. When using large diameter tubing, the possibility of surface defects is increased further due to greater surface area. It is strongly recommended that the heavier wall thicknesses be selected. Penetration of the ferrules on thin wall tubing or soft material may not offer enough radial resistance for sealing.

Values in reverse text are not recommended for Gas Service.

GAP GAGE

Gap Gages can be purchased to ensure the Installer and Inspector that the nut has been properly tightened.

When fitting is properly tightened, gap gage should not fit between nut and shoulder of body.

PRECAUTIONS FOR WELD END

CBC-Lok®/CS-Lok® Tube Fittings with weld ends offer the same positive sealing as all other Tylok fittings. Welding could deform the assembly, making pull ups or disassembly difficult. Some precautions should be taken:

- Remove the nut and ferrules from the fitting
- It is important that the fitting threads and sealing surfaces be protected from weld splatter
- A heat sink should be used to dissipate heat
- Ensure alignment by tack welding symmetrically
- Once welded, remove the weld splatter protection and reassemble nut and ferrules on fitting

SAFETY GUIDELINES

- Never connect, disconnect or remake a fitting with pressure in the system
- Make sure all fittings are properly installed, reference Installation Instructions - page 53, before pressurizing the system
- Tubing material should be softer than fitting material
- Tylok recommends using only Tylok replacement parts
- Although the fittings will hold to the pressure rating of the tubing, it is not recommended to go beyond this rating. Elongation could occur in the tubing, shrinking the wall thickness and causing potential harm to anyone in the area
- Always use proper thread lubricants and sealants on tapered pipe threads
- If process fluids are toxic and/or hazardous, exercise extra caution
- Never bleed a system by loosening a fitting
- For proper sealing it is recommended that the tubing and fitting be of like material

QUALITY CONTROL

All components are manufactured and inspected to meet strict quality control standards in each phase of production. All employees are thoroughly trained to follow procedures, in accordance with the ISO 9001:2008 Quality Standard, to ensure a quality product from the start of each job through completion.

PIPE THREAD SPECIFICATIONS

Tylok Pipe Fittings are manufactured from materials meeting applicable ASTM or ASME specifications, with pipe threads which meet or exceed ANSI B1.20.1 requirements. Strict quality control procedures are followed throughout production to provide the finest possible product.

Materials: • Brass • 316 Stainless Steel • Steel

These charts are to be used as a guide only and are based on normal wall thicknesses, used for the various sizes. These ratings may vary widely from effects such as the proper use of sealants, size of stock, temperature, corrosion factors, etc. Therefore, Tylok International, Inc., assumes no responsibility for its accuracy in any individual design.

Pressure ratings for Tylok tube fittings that have differing end connection styles shall use the lowest of the pressure ratings.

TUBE PRESSURE DERATING FACTORS AT ELEVATED TEMPERATURES

The table lists derating factors that must be considered in applications above that of ambient temperatures.

Example

Type 316 Stainless Steel 1/4" O.D. x .049" wall at 800°F is:
7,500 PSI x .79 = 5.925 PSI.

Therefore, the suggested allowable working pressure for 316 Stainless Steel (1/4" O.D. with .049" tube wall) at 800°F is 6,000 PSI.

Suggested Maximum Operating Pressures for Pipe Threads (psig)

NPT Size	316 SS & Carbon Steel		Brass	
	Male	Female	Male	Female
1/16"	11000	5500	6700	3300
1/8"	10100	5000	6500	3200
1/4"	8000	4000	6600	3300
3/8"	7800	3900	5300	2600
1/2"	7700	3800	4900	2400
3/4"	7300	3600	4600	2300
1"	5300	2600	4400	2200

Tylok Instrumentation Fittings are rated at the following temperatures:	
316 Stainless	-325°F to 1000°F (-198°C to 648°C)
Brass	-40°F to 400°F (-40°C to 204°C)
Steel	-65°F to 375°F (-54°C to 190°C)

Consideration should be given to maximize temperature ratings if fittings and/or tubing are coated or plated.

TEMPERATURES		TUBING MATERIAL		
°F	°C	Carbon Steel	304 SS	316 SS
200	93	0.95	1.00	1.00
300	149	0.90	1.00	1.00
400	204	0.87*	0.93	0.96
500	260		0.87	0.89
600	316		0.82	0.85
700	371		0.8	0.81
800	427		0.76	0.79
900	482		0.73	0.77
1000	538		0.69	0.76

*Based on 375°F (190°C) max

TEMPERATURES		TUBING MATERIAL
°F	°C	Copper
100	38	1.00
150	66	0.85
200	93	0.80
250	121	0.80
300	149	0.78
350	177	0.66
400	204	0.50

HEAT TRACEABILITY

Tylok® Tube Fittings are completely heat code traceable back to the original mill heat from which they were made. Starting with the original billet, the mill creates a certificate that completely describes the chemical and physical makeup. For any one of the four components (body, front ferrule, rear ferrule, nut), the material certifications can be provided. Call Tylok and provide the heat code stamp marked on the part itself, along with the part number to obtain the certificate.

RAW MATERIAL SPECIFICATIONS

FITTING MATERIAL	BAR STOCK	FORGING	TUBING SPECIFICATION*
Brass	ASTM B16 Alloy 360 ASTM B453 Alloy 345	ASTM B124 Alloy 377	ASTM B75 Copper (Temper O)
Stainless Steel	ASTM A276 ASME SA479 Type 316-SS	ASME SA182 Type 316-SS	ASTM A213 ASTM A269
Steel	ASTM-A108		ASTM A179

*Reference Tubing Selection & Preparation

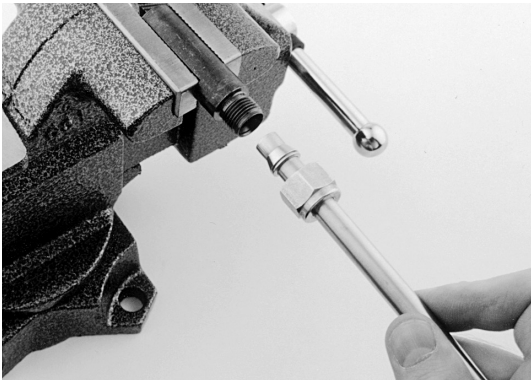
TYLOK PRE-SET TOOL

The CBC-Lok®/CS-Lok® product line offers a Pre-Set Tool when fittings need to be installed in hard to reach places. The Pre-Set Tool is designed to be used in any tabletop vise. After tightening the nut the specified number of turns, as stated in the included installation instructions, loosen the nut from the Pre-Set Tool. Once the ferrules have swaged into the tubing surface, the assembly is ready for installation.

When ordering the CBC-Lok®/CS-Lok® Pre-Set Tool, reference the part number in the chart. The Pre-Set Tool is hardened for maximum durability. The Pre-Set Tool can be used repeatedly to set the ferrules onto the tubing for easy installation.

PART NUMBER	TUBE SIZE
1-DPST	1/16”
2-DPST	1/8”
3-DPST	3/16”
4-DPST	1/4”
5-DPST	5/16”
6-DPST	3/8”
8-DPST	1/2”
10-DPST	5/8”
12-DPST	3/4”
14-DPST	7/8”
16-DPST	1”

Place Pre-Set Tool in a vice and tighten nut specified number of turns.



Back nut off of Pre-Set Tool. Notice the ferrules have swaged into the tubing. Now take tubing to installation area.

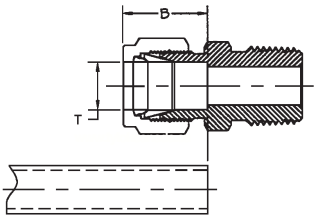
TUBE INSERTION CHART

For pre-cutting tubing to length, the following chart shows the additional length inside the fitting assembly.

TUBE SIZE	T TUBE OD	B INSERTION DEPTH
1	1/16	0.34
2	1/8	0.52
3	3/16	0.54
4	1/4	0.61
5	5/16	0.65
6	3/8	0.67
8	1/2	0.90
10	5/8	0.96
12	3/4	0.96
14	7/8	1.02
16	1	1.24

NOTE: Dimensions subject to change, to be used for reference only.

TUBE INSERTION DEPTH FINGER TIGHT



TUBING–GENERAL APPLICATIONS

Tylok® Tube Fittings are designed to perform in a variety of applications that demand high performance. The CBC-Lok® and CS-Lok® product lines have been engineered to provide optimal performance. However, tubing should always be considered as an important factor in the design stages of any system. Below is a table that describes some general uses for different types of materials. The table is provided as a reference to the Engineer in the design process.

Tylok suggests the use of seamless, fully annealed tubing. Welded tubing may be used with Tylok fittings. However, due to the manufacturing of welded tubing, variables may be encountered. The media flowing through the tubing must be compatible with the tubing itself. It is always a good rule to use like tubing material on like fitting material. If this format is not followed, the ferrules may have difficulty penetrating the tubing, adversely affecting the sealing ability. In addition, dissimilar materials in contact may be sensitive to galvanic corrosion. Tylok recommends ordering tubing material to meet ASTM specifications to ensure that it will be dimensionally, physically and chemically within precise limits. (See Raw Material Specifications chart on page 62.)

TUBING MATERIAL	GENERAL APPLICATIONS
Carbon Steel	Air Lines, High Pressure, High Temperature, Oil, Air, Specialty Chemicals, Hydraulic Gases
Copper	Low Temperature, Low Pressure Water, Oil, Air, Pneumatic Controls, Lube Lines
Stainless Steel	High Pressure, High Temperature, Nitrogen, Helium, Flammable Gases, Hydraulic Gases, generally corrosive media

In designing a system incorporating tube fittings and valves, it is the designer's or user's obligation and responsibility to determine the appropriate fittings and valves to be used for each application and to insure proper installation and maintenance.

LIMITED WARRANTY

Tylok fittings and valves are warranted solely against defects in material and workmanship in the performance of the specific functions for which they are designed, as set forth in the published specifications, for a period of 12 months. Should any fitting and valve or its component fail due to a defect in material or workmanship, Tylok will replace said fitting and valve without charge upon return of the failed part and evidence of its failure being due to materials or workmanship.

The Warranty above set forth is the only warranty applicable to Tylok products, and is in lieu of any and all other warranties either express or implied, including any warranty of merchantability or fitness. Tylok's sole responsibility or liability as a result of any loss or damage due to failure shall be to replace the failed part or fitting and valve, and it shall bear no liability for any incidental or consequential damages to person or property.

Tylok Liquid Leak Detectors

Tylok liquid Leak Detectors detect gas leaks in hard-to-reach areas

- Safe for oxygen systems
- Sustained bubble action works even on very small leaks and vertical surfaces
- Flexible tube extends for hard-to-reach areas
- Formula dries clean, without staining

Part Number	Container Size	Pull Out Tube Length
LEAK DETECTOR-8oz	8 fl oz. (236ml)	12 inch (30.48cm)
LEAK DETECTOR-Gal	1 Gallon	
LEAK DETECTOR COOL-8oz	8 fl oz. (236ml)	12 inch (30.48cm)
LEAK DETECTOR COOL-Gal	1 Gallon	

TYLOK LIQUID LEAK DETECTOR

- Temperature rating: Can be used over a temperature range of 27 to 200° F (-2 to 93° C)

Specifications: Meets the performance requirement of:

- MIL-PRF-25567 Leak Detector Compound, Oxygen Systems, Type I, 1 to 70° C (33 to 158° F)
- NFPA 52 Section 6-12.2 Leak Testing Compressed Natural Gas Vehicular Fuel System
- EPA Part 60, Appendix A, Method 21, Section 4.3.3 Alternative Screening Procedures Using Soap Solutions
- Nontoxic, noncorrosive, nonflammable

TYLOK LOW TEMPERATURE LIQUID LEAK DETECTOR

- Temperature rating: Can be used over a temperature range of -65 to 200F (-54 to 93° C)

Specifications: Meets the performance requirement of:

- MIL-PRF-25567 Leak Detector Compound, Oxygen Systems, Type II, -54 to 1° C (-65 to 33° F)
- NFPA 52 Section 6-12.2 Leak Testing Compressed Natural Gas Vehicular Fuel System
- EPA Part 60, Appendix A, Method 21, Section 4.3.3 Alternative Screening Procedures Using Soap Solutions
- Noncorrosive, nonflammable