The Original Flame-Free
Refrigerant Press Fittings

Engineering Submittal

Job Name:	Engineer/Architect:
Job Location:	Wholesaler:
Submittal Date:	Contractor:

PROUDLY MADE IN AMERICA

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15-Year Limited Warranty

All RLS press fittings are backed by a 15-year limited warranty when installed in accordance with RLS installation instructions using RLS-approved tools and jaws. See information on rapidlockingsystem.com for complete details.

Compatible Refrigerant List:

A1	134A	404A	407A	407B	407C	407F	407G	407H	410A
	417A	421A	422A	422B	422C	422D	424A	427A	434A
	437A	438A	448A	449A	449B	449C	450A	452A	452C
	453A	456A	507A	513A	513B	718	Ethylene Glycol	22*	
A2L	32	143a	444A	444B	445A	446A	447A	447B	451A
	451B	452B	454A	454B	454C	455A	457A	1234yf	1234ze
A3	290	600	600A	601	601A				

RLS press fittings and seals are compatible with the above refrigerants. Refrigerant compliance varies by region and/or jurisdiction, so consult your local codes and standards to ensure RLS press fittings are compliant with your fluid. Refer to our chart at rapidlockingsystem.com/resources/approved-refrigerants for the most up-to-date list.

**Special order item. Chlorinated fluid requires a Neoprene seal (o-ring) in place of HNBR. Minimal product offering available.*

RLS fittings are also compatible with the following industrial (non-refrigerant) gasses: nitrogen, argon, helium and oxygen (non-medical).

WARNING

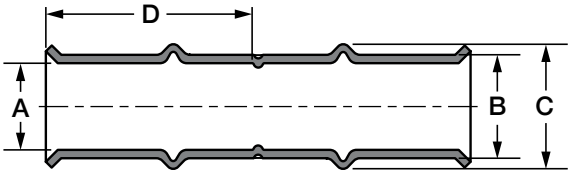
FAILURE TO FOLLOW INSTALLATION INSTRUCTIONS, IMPROPER SELECTION OR IMPROPER USE OF RLS FITTINGS AND RELATED ACCESSORIES ("PRODUCTS") CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocution from high voltage electric power lines.
- Contact with suddenly moving or falling objects that are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.
- Dangerously whipping copper line.
- Contact with conveyed fluids that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity buildup or other sources of electricity.
- Sparking or explosion from flammable liquids.

FOLLOW THE INSTALLATION INSTRUCTIONS.

Couplings

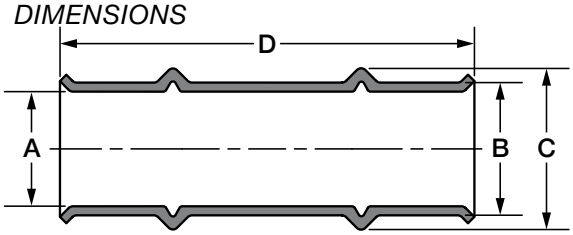
DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)				Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D			
1/4	3011040400111	0.26	0.34	0.45	0.95	10	100	2.3 lbs.
5/16	3011050500111	0.32	0.40	0.52	0.93	10	100	2.9 lbs.
3/8	3011060600111	0.39	0.47	0.59	0.98	10	100	3.5 lbs.
1/2	3011080800111	0.51	0.59	0.73	1.25	10	100	6.1 lbs.
5/8	3011101000111	0.64	0.74	0.89	1.24	10	100	9.5 lbs.
3/4	3011121200111	0.76	0.88	1.07	1.29	10	40	5.5 lbs.
7/8	3011141400111	0.89	1.02	1.19	1.31	10	40	7.0 lbs.
1	3011161600111	1.01	1.16	1.36	1.31	10	40	9.5 lbs.
1-1/8	3011181800111	1.14	1.29	1.45	1.29	10	40	10.3 lbs.
1-1/4	3011202000111	1.26	1.41	1.62	1.30	12	24	7.4 lbs.
1-3/8	3011222200111	1.39	1.54	1.75	1.57	12	24	9.0 lbs.
1-5/8	3011262600111	1.64	1.88	2.18	1.85	4	4	3.4 lbs.
2-1/8	3011343400111	2.14	2.38	2.68	2.34	4	4	5.5 lbs.

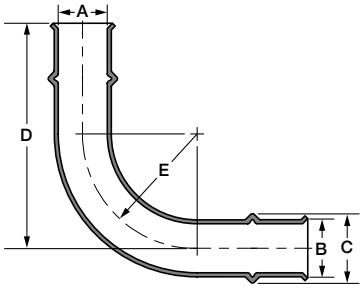
Slip Couplings

DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)				Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D			
1/4	3021040400111	0.26	0.34	0.45	2.00	10	100	2.3 lbs.
5/16	3021050500111	0.32	0.40	0.52	2.01	10	100	2.9 lbs.
3/8	3021060600111	0.39	0.47	0.59	2.05	10	100	3.5 lbs.
1/2	3021080800111	0.51	0.59	0.73	2.74	10	100	6.1 lbs.
5/8	3021101000111	0.64	0.74	0.89	2.75	10	100	9.5 lbs.
3/4	3021121200111	0.76	0.88	1.07	2.75	10	40	5.5 lbs.
7/8	3021141400111	0.89	1.02	1.19	2.74	10	40	7.0 lbs.
1-1/8	3021181800111	1.14	1.29	1.45	2.77	10	40	10.3 lbs.
1-3/8	3021222200111	1.39	1.54	1.75	3.15	12	24	9.0 lbs.

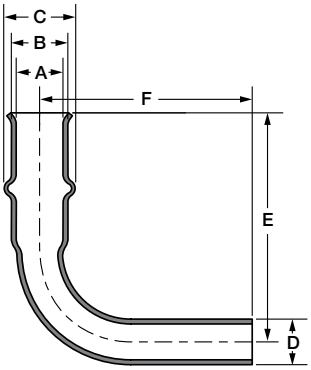
90° Elbows



Size (Inch)	Part Number	Dimensions (Inches)					Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D	E			
1/4	3031040400111	0.26	0.34	0.45	2.01	0.68	10	100	4.4 lbs.
5/16	3031050500111	0.32	0.40	0.52	2.13	0.81	10	100	5.8 lbs.
3/8	3031060600111	0.39	0.47	0.59	2.27	0.93	10	100	7.4 lbs.
1/2	3031080800111	0.51	0.59	0.73	2.88	1.18	10	100	11.6 lbs.
5/8	3031101000111	0.64	0.74	0.89	3.21	1.47	10	100	20.0 lbs.
3/4	3031121200111	0.76	0.88	1.07	3.47	1.76	10	40	12.3 lbs.
7/8	3031141400111	0.89	1.02	1.19	3.75	2.03	10	40	16.6 lbs.
1	3031161600111	1.01	1.16	1.36	4.04	2.33	10	40	22.2 lbs.
1-1/8	3031181800111	1.14	1.29	1.45	4.29	2.54	10	40	27.8 lbs.
1-1/4	3031202000111	1.26	1.41	1.62	4.30	2.53	5	5	3.7 lbs.
1-3/8	3031222200111	1.39	1.54	1.75	4.54	2.75	5	5	4.9 lbs.
1-5/8	3031262600111	1.64	1.88	2.18	5.49	3.25	2	2	4.6 lbs.
2-1/8	3031343400111	2.14	2.38	2.68	6.83	4.25	2	2	7.3 lbs.

90° Street Elbows

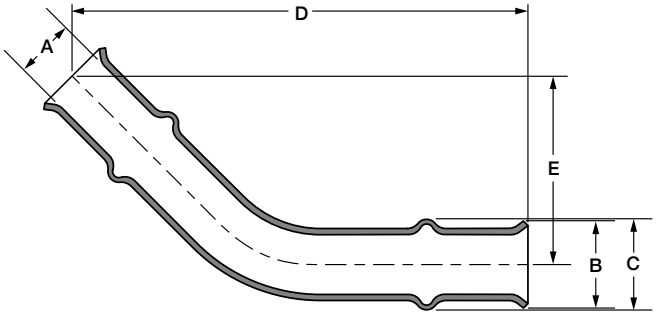
DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)						Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D	E	F			
3/8	3501060600111	0.39	0.47	0.59	0.38	1.75	1.89	10	100	4.8 lbs.
1/2	3501080800111	0.51	0.59	0.73	0.50	2.56	2.65	10	100	9.2 lbs.
5/8	3501101000111	0.64	0.74	0.89	0.63	2.64	2.81	10	100	15.1 lbs.
3/4	3501121200111	0.76	0.88	1.07	0.75	3.00	3.15	10	40	9.2 lbs.
7/8	3501141400111	0.89	1.02	1.19	0.88	3.25	3.40	10	40	12.7 lbs.
1-1/8	3501181800111	1.14	1.29	1.45	1.13	3.80	3.93	10	40	22.1 lbs.
1-3/8	3501222200111	1.39	1.54	1.75	1.38	4.38	4.51	5	5	3.8 lbs.

45° Elbows

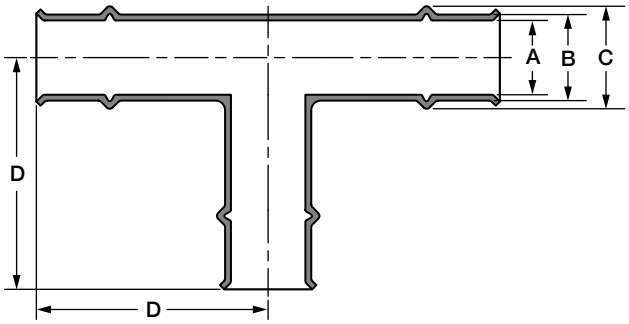
DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)					Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D	E			
3/8	3081060600111	0.39	0.56	0.59	2.94	1.21	10	100	5.8 lbs.
1/2	3081080800111	0.51	0.71	0.73	3.72	1.54	10	100	9.6 lbs.
5/8	3081101000111	0.64	0.86	0.88	3.97	1.64	10	100	15.9 lbs.
3/4	3081121200111	0.76	1.02	1.07	4.12	1.70	10	40	9.4 lbs.
7/8	3081141400111	0.89	1.13	1.19	4.49	1.86	10	40	12.7 lbs.
1-1/8	3081181800111	1.14	1.41	1.45	4.84	2.00	10	40	20.2 lbs.
1-3/8	3081222200111	1.39	1.68	1.75	5.11	2.11	5	5	3.8 lbs.
1-5/8	3081262600111	1.64	2.00	2.18	6.22	2.58	2	2	3.1 lbs.
2-1/8	3081343400111	2.14	2.57	2.68	7.44	3.08	2	2	4.7 lbs.

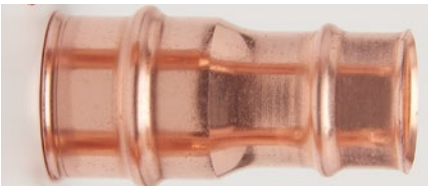
Tees

DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)				Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D			
3/8	3091060606111	0.39	0.47	0.59	1.63	10	100	8.4 lbs.
1/2	3091080808111	0.51	0.59	0.72	2.23	10	100	26.4 lbs.
5/8	3091101010111	0.64	0.74	0.87	2.30	10	100	26.8 lbs.
3/4	3091121212111	0.76	0.88	1.05	2.38	10	40	15.0 lbs.
7/8	3091141414111	0.89	1.02	1.19	2.43	10	40	20.3 lbs.
1	3091161616111	1.01	1.16	1.36	2.59	10	40	23.7 lbs.
1-1/8	3091181818111	1.14	1.29	1.45	2.56	10	40	30.4 lbs.
1-1/4	3091202020111	1.26	1.41	1.62	3.36	5	5	4.7 lbs.
1-3/8	3091222222111	1.39	1.54	1.75	3.36	5	5	5.3 lbs.
1-5/8	3091262626111	1.64	1.88	2.18	3.95	2	2	4.7 lbs.
2-1/8	3091343434111	2.14	2.38	2.68	4.18	2	2	6.3 lbs.

Reducers



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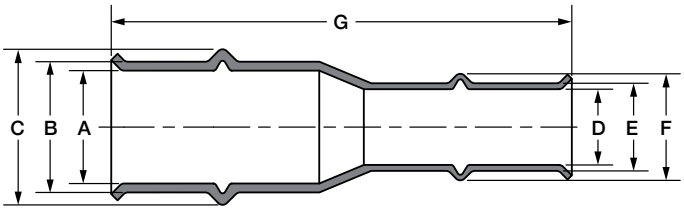
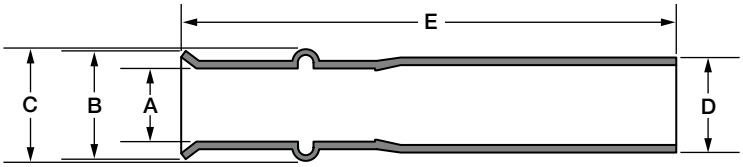


Size (Inch)	Part Number	Dimensions (Inches)							Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D	E	F	G			
3/8 to 1/4	3051060400111	0.39	0.47	0.59	0.26	0.34	0.45	2.24	10	100	3.8 lbs.
1/2 to 1/4	3051080400111	0.51	0.59	0.73	0.26	0.34	0.45	2.71	10	100	5.0 lbs.
1/2 to 3/8	3051080600111	0.51	0.59	0.73	0.39	0.47	0.58	2.58	10	100	5.5 lbs.
5/8 to 1/4	3051100400111	0.64	0.74	0.89	0.26	0.34	0.45	2.70	10	100	7.9 lbs.
5/8 to 3/8	3051100600111	0.64	0.74	0.89	0.39	0.47	0.58	2.70	10	100	8.1 lbs.
5/8 to 1/2	3051100800111	0.64	0.74	0.87	0.51	0.59	0.72	3.10	10	100	8.7 lbs.
3/4 to 1/2	3051120800111	0.76	0.88	1.05	0.51	0.59	0.72	3.10	10	40	4.7 lbs.
3/4 to 5/8	3051121000111	0.76	0.88	1.05	0.64	0.74	0.87	3.00	10	40	5.2 lbs.
7/8 to 1/2	3051140800111	0.89	1.02	1.19	0.51	0.59	0.72	3.05	10	40	5.6 lbs.
7/8 to 5/8	3051141000111	0.89	1.02	1.19	0.64	0.74	0.87	3.05	10	40	6.6 lbs.
7/8 to 3/4	3051141200111	0.89	1.02	1.19	0.76	0.88	1.05	3.11	10	40	7.3 lbs.
1 to 7/8	3051161400111	1.01	1.16	1.37	0.89	1.02	1.19	3.09	10	40	9.1 lbs.
1-1/8 to 5/8	3051181000111	1.14	1.29	1.45	0.64	0.74	0.87	3.25	10	40	9.0 lbs.
1-1/8 to 3/4	3051181200111	1.14	1.29	1.45	0.76	0.88	1.05	3.18	10	40	9.6 lbs.
1-1/8 to 7/8	3051181400111	1.14	1.29	1.45	0.89	1.02	1.19	3.10	10	40	9.9 lbs.
1-3/8 to 7/8	3051221400111	1.39	1.54	1.75	0.89	1.02	1.19	3.66	12	24	7.9 lbs.
1-3/8 to 1-1/8	3051221800111	1.39	1.54	1.75	1.14	1.29	1.45	3.34	12	24	8.2 lbs.
1-5/8 to 1-1/8	3051261800111	1.64	1.88	2.18	1.14	1.29	1.45	4.50	4	4	2.9 lbs.
1-5/8 to 1-3/8	3051262200111	1.64	1.88	2.18	1.39	1.54	1.75	4.30	4	4	3.0 lbs.
2-1/8 to 1-3/8	3051342200111	2.14	2.38	2.68	1.39	1.54	1.75	5.20	4	4	4.3 lbs.
2-1/8 to 1-5/8	3051342600111	2.14	2.38	2.68	1.64	1.88	2.18	5.05	4	4	5.2 lbs.

Reducing Bushings

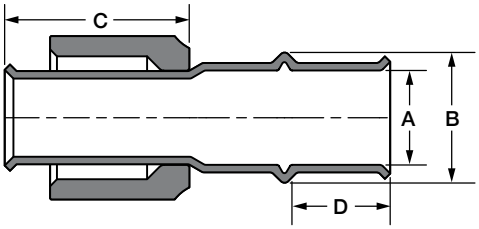
DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)					Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D	E			
1/2 to 3/8	3521080600111	0.39	0.56	0.59	0.50	2.50	10	100	4.6 lbs.
5/8 to 1/2	3521100800111	0.51	0.68	0.72	0.63	2.95	10	100	7.3 lbs.
3/4 to 5/8	3521121000111	0.64	0.84	0.87	0.75	2.98	10	40	4.4 lbs.
7/8 to 3/4	3521141200111	0.76	1.02	1.05	0.88	3.04	10	40	5.9 lbs.
1-1/8 to 7/8	3521181400111	0.89	1.10	1.19	1.13	3.06	10	40	8.5 lbs.
1-3/8 to 1-1/8	3521221800111	1.14	1.40	1.45	1.38	3.12	12	24	7.0 lbs.

SAE/Euro Flares

DIMENSIONS



Per ARI Guideline M-97 45° Refrigeration Flare Fittings and Copper Tubing

Size	Torque, ft-lbs [N*m]	
	Minimum	Maximum
1/4"	8 [11]	10 [14]
3/8"	15 [20]	25 [34]
1/2"	25 [34]	35 [47]
5/8"	40 [54]	55 [75]
3/4"	50 [68]	60 [81]

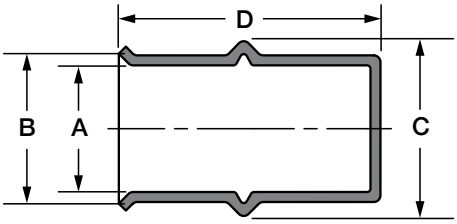
Note: Per Section 9.5 of the M-97 Guideline, when applying torque to the flare connection the use of lubricants/lubrication is not recommended.

Note: Applying a torque above the maximum limit may distort or damage the sealing surface of the flare.

Size (Inch)	Part Number	Dimensions (Inches)				Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D			
1/4	3291040000111	0.26	0.45	1.38	0.56	10	100	2.5 lbs.
3/8	3291060000111	0.39	0.59	1.38	0.58	10	100	3.7 lbs.
1/2	3291080000111	0.51	0.72	1.13	0.75	10	100	5.9 lbs.
5/8	3291100000111	0.64	0.87	1.48	0.75	10	40	3.6 lbs.
3/4	3291120000111	0.76	1.05	1.48	0.80	10	40	5.2 lbs.

Caps

DIMENSIONS

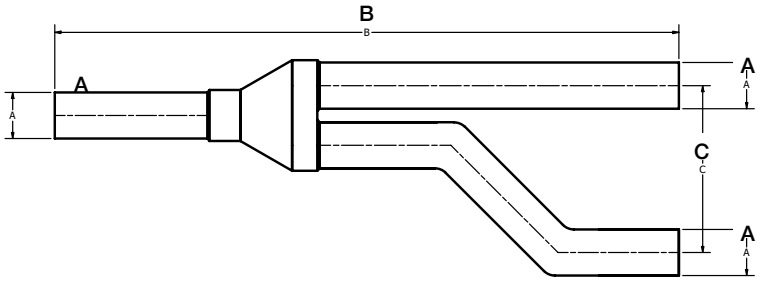


Size (Inch)	Part Number	Dimensions (Inches)				Box Quantity	Carton Quantity	Carton Weight
		A	B	C	D			
1/4	3071040000111	0.26	0.34	0.45	1.45	10	100	1.8 lbs.
5/16	3071050000111	0.32	0.40	0.52	1.45	10	100	2.3 lbs.
3/8	3071060000111	0.39	0.47	0.59	1.45	10	100	2.6 lbs.
1/2	3071080000111	0.51	0.59	0.72	1.97	10	100	5.1 lbs.
5/8	3071100000111	0.64	0.74	0.87	1.98	10	100	6.9 lbs.
3/4	3071120000111	0.76	0.88	1.05	1.97	10	40	3.8 lbs.
7/8	3071140000111	0.89	1.02	1.19	1.90	10	40	4.9 lbs.
1	3071160000111	1.01	1.16	1.36	2.00	10	40	7.2 lbs.
1-1/8	3071180000111	1.14	1.29	1.45	1.99	10	40	7.8 lbs.
1-1/4	3071200000111	1.26	1.41	1.62	2.50	12	24	6.5 lbs.
1-3/8	3071220000111	1.39	1.54	1.75	2.49	12	24	7.2 lbs.

ODM products are compatible with RLS fittings.

ODM Y-Joints

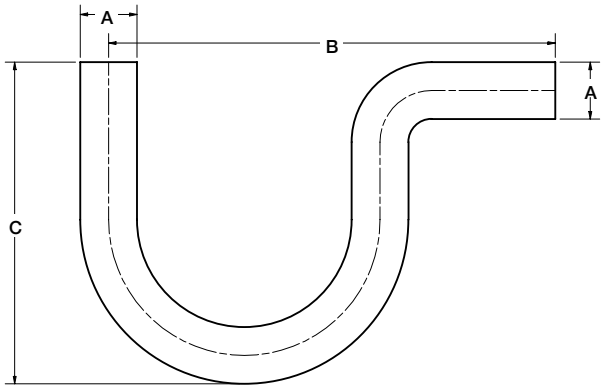
DIMENSIONS



Size (Inch)	Part Number with insulation	Part Number without insulation	Dimensions (Inches)			Box Quantity	Carton Quantity
			A	B	C		
3/8	3771060606130	3771060606111	0.38	7.56	2.36	2	44
1/2	3771080808130	3771080808111	0.50	8.94	2.48	2	44
5/8	3771101010130	3771101010111	0.63	9.45	2.60	2	42
3/4	3771121212130	3771121212111	0.75	10.16	2.72	2	24
7/8	3771141414130	3771141414111	0.88	12.09	2.87	2	24
1-1/8	3771181818130	3771181818111	1.13	13.11	3.54	1	10
1-3/8	3771222222130	3771222222111	1.38	14.92	4.06	1	10

ODM P-Traps

DIMENSIONS

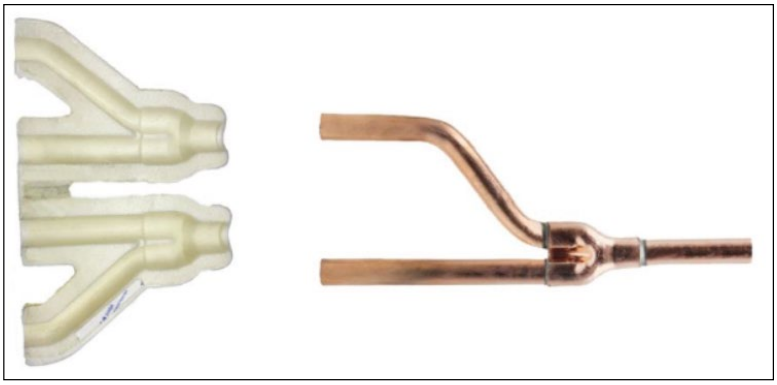


Size (Inch)	Part Number	Dimensions (Inches)			Box Quantity	Carton Quantity
		A	B	C		
1/2	3761080800111	0.50	5.12	3.54	2	80
5/8	3761101000111	0.63	5.12	3.62	2	80
3/4	3761121200111	0.75	5.91	4.25	2	38
7/8	3761141400111	0.88	6.69	4.65	2	38
1-1/8	3761181800111	1.13	8.27	5.98	2	10
1-3/8	3761222200111	1.38	10.24	7.48	2	10

Copper Y-Branch w/ XPE Insulation

Use:

Designed for use within A/C systems (HVAC, VRV/VRF, split, multi-split, coldroom, and cold chain), Heat Pumps, Geothermal Energy, and other gas systems.



Design Features:

- Designed to comply with ASTM B280 standard specifications for seamless copper tube for ACR field service.
- Suitable for HFC and CFC refrigerants (Note: RLS fitting may not be approved for some of the below).
  - R1234yf, R1234ze, R125, R134a, R143a, R290, R32, R404a, R407a, R407c, R407f, R410a, R447a, R448a, R449a, R450a, R452a, R452b, R507, R513a, R718, R774
- XPE Insulation Features:
  - ECO-friendly, non-toxic, and odorless
  - Superior thermal stability
  - Anti-bacterial, w/excellent chemical and oil resistance
  - Waterproof w/low thermal conductivity
  - Excellent cushioning and shock-absorption properties
  - R-value of 2.55 to 2.78
  - Working temp -40°F to 230°F (-40°C to 110°C)
  - Class B FR, Self-Extinguishing
  - Halogen-Free FR
  - Tested using UL 94 HF-1 & HF-2 criteria
- Five-year warranty from install date

Operating Specifications:

- Temperature: -22° to 248°F (-30°C to 120°C)
- Min Burst Pressure (per UL 207): 1900 psi
- Max Op. Pressure: 750 psi

Certifications and Approvals:

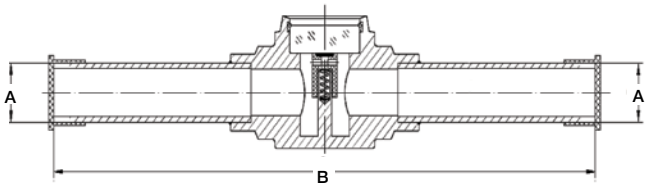
- UL/cUL 207
- REACH
- CE approved

Ancillary Products

ODM products are compatible with RLS fittings.

ODM Sight Glasses

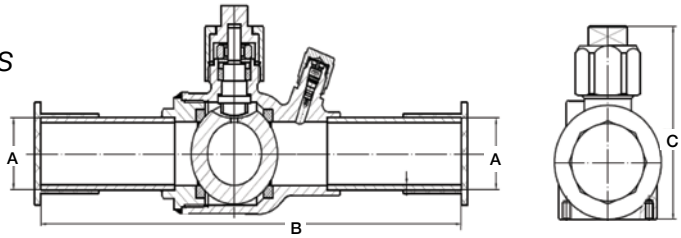
DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)		Box Quantity	Carton Quantity
		A	B		
1/4	3781040400111	0.25	4.02	1	100
3/8	3781060600111	0.37	4.69	1	100
1/2	3781080800111	0.50	6.10	1	100
5/8	3781101000111	0.63	6.14	1	50
3/4	3781121200111	0.75	6.34	1	50
7/8	3781141400111	0.88	6.57	1	50
1-1/8	3781181800111	1.13	7.56	1	30

ODM Ball Valves
(Bi-Directional with Schrader valves)

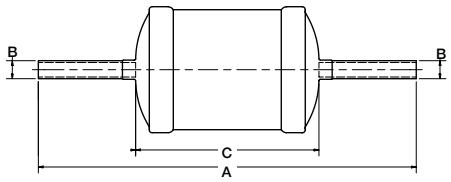
DIMENSIONS



Size (Inch)	Part Number	Dimensions (Inches)			Box Quantity	Carton Quantity
		A	B	C		
1/4	3791040400111	0.25	6.75	2.02	1	40
3/8	3791060600111	0.37	6.34	2.02	1	40
1/2	3791080800111	0.50	6.56	2.02	1	40
5/8	3791101000111	0.63	6.77	2.30	1	40
3/4	3791121200111	0.75	6.99	2.60	1	30
7/8	3791141400111	0.88	7.24	2.60	1	30
1-1/8	3791181800111	1.13	8.16	3.27	1	30
1-3/8	3791222200111	1.37	9.00	3.88	1	24

ODM Filter Driers

DIMENSIONS



Size (Inch)	Part Number	Desiccant (Cubic Inches)	Dimensions (Inches)			Box Quantity	Carton Quantity
			A	B	C		
3/8 Liquid Line	3821060600111	8	7.95	0.38	3.90	1	30
3/8 Liquid Line	3831060600111	16	8.86	0.38	4.80	1	30
1/2 Liquid Line	3831080800111	16	8.94	0.50	4.80	1	30
3/8 Liquid Line Bi-Directional	3921060600111	8	7.87	0.38	3.82	1	30
3/8 Liquid Line Bi -Directional	3931060600111	16	8.66	0.38	4.61	1	30

Part Number	Connections Inlet/Outlet	Flow Capacity Ton @ 1psi∆ P (For kw Multiply Ton By 3.5)				Water Capacity Drops of Water									
						R134a		R22		R407c		R410A		R404A & R507	
		R134a	R22 & R410A	R407C	R404A & R507	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F
3821060600111	3/8" ODM	5.42	6.0	6.0	4.0	265	245	250	225	205	165	170	130	275	260
3831060600111	3/8" ODM	6.2	6.8	6.8	4.57	396	366	271	336	306	246	256	196	406	286
3831080800111	1/2" ODM	8.5	9.4	9.4	6.2	396	366	271	336	306	246	256	196	406	286
3921060600111	3/8" ODM	4.8	5.1	5.0	3.33	265	245	250	225	205	165	170	130	275	260
3931060600111	3/8" ODM	4.9	5.2	5.2	3.49	359	341	360	307	361	333	327	302	392	365

All ratings are in accordance with ANSI/AHRI standard 710-2009.

NBV-SZ Press Compatible Ball Valve

Use:

Full port ball valve compatible with press-fit ends for use in refrigeration, commercial HVAC, VRV, VRF, multi-mini split, and sub-critical applications.

Design Features:

- Full port valves with 900 PSIG maximum working pressure on sizes up to 7/8”
- Compatible with HCFC, HFC, and HFO refrigerants and oils
- Dual sealed on the valve stem using PTFE seal technology
- Rupture-proof encapsulated stem and bi-directional flow
- Two-piece stem cap, no removal for valve operation
- One piece brass oven-brazed body
- 100% leak tested
- Stamped with serial number and packaged in poly-bag
- Two-year warranty

Operating Specifications:

- Temperature: -40° to 302°F (-40°C to 150°C)
- Burst Pressure: 5 times working pressure
- Leak Rate: <0.02g/year
- Life Expectancy: >50,000 cycles

PART	MATERIAL SPECIFICATIONS
STUBS	Copper
SEALS AND SEATS	Teflon (PTFE)
CAP	Brass
STEM	Stainless Steel
LOCK NUT	Brass/Stainless Steel
BODY	Brass
SCHRADER CAP	Brass
BALL	Stainless Steel

Certifications and Approvals:

- UL/cUL 207
- CRN recognized
- CE approved
- RoHS

PART #	Description	Max. Working Pressure		WEIGHT	
		PSI	BAR	LG	KG
3791040400111	1/4" ODM Ball Valve w/Schrader	900	62	0.463	0.210
3791060600111	3/8" ODM Ball Valve w/Schrader	900	62	0.474	0.215
3791080800111	1//2" ODM Ball Valve w/Schrader	900	62	0.496	0.225
3791101000111	5/8" ODM Ball Valve w/Schrader	900	62	0.710	0.320
3791121200111	3/4" ODM Ball Valve w/Schrader	900	62	0.990	0.450
3791141400111	7/8" ODM Ball Valve w/Schrader	900	62	0.100	0.500
3791181800111	1-1/8" ODM Ball Valve w/Schrader	700	48	0.900	0.860
3791222200111	1-3/8" ODM Ball Valve w/Schrader	700	48	0.100	1.405

For dimensions, refer to page 10.

Klauke® 32 kN and 19 kN Press Tools

Benefits:

- Durable, high-quality construction that is built to last
- Short pressing cycle – 10 seconds or less – increases productivity
- Compact design and 350° jaw rotation allows technician to install in tight spaces
- Automatic piston return
- Safety feature that lets the press cycle be interrupted, allowing for manual release of the piston, if needed
- High-quality, powerful Makita Li-Ion technology, with charging time of just 15 minutes (2 batteries and 1 charger included)
- Tool service indicated via imbedded LEDs, illuminates at 10,000 cycles

32 kN press tool

19 kN press tool

32 kN Tool Features:

Pressing Force: 32 kN

Presses/charge: 350-400 (4.0 Ah)

Battery Capacity: 18V / 4.0 Ah Li-Ion Makita (BL1840B)

Charging Time: 15 minutes

Operating Temp. Range: -10°C to 40°C (14°F to 104°F)

Weight with Battery:
Without Jaw: 3.6 kg (8.0 lb)
Including Jaw: 5.7 kg (12.5 lb)

Dimensions: 359 x 76 x 317 mm

19 kN Tool Features:

Pressing Force: 19 kN

Presses/charge: 100-150 (2.0 Ah)

Battery Capacity: 18V / 2.0 Ah Li-Ion Makita (BL1820B)

Charging Time: 15 minutes

Operating Temp. Range: -10°C to 40°C (14°F to 104°F)

Weight with Battery:
Without Jaw: 1.8 kg (4.0 lb)
Including Jaw: 3.1 kg (6.8 lb)

Dimensions: 395 x 80 x 118 mm

Klauke® Jaws

Klauke 32 kN Jaws

Size	Part Number
1/4"	399021321040
5/16"	399021321050
3/8"	399021321060
1/2"	399021321080
5/8"	399021321100
3/4"	399021321120
7/8"	399021321140
1"	399021321160
1-1/8"	399021321180
1-1/4"	399021321200
1-3/8"	399021321220
8-Jaw Kit	399031320801

Klauke 19 kN Jaws

Size	Part Number
1/4"	399021191040
5/16"	399021191050
3/8"	399021191060
1/2"	399021191080
5/8"	399021191100
3/4"	399021191120
7/8"	399021191140
1"	399021191160
1-1/8"	399021191180
1-1/4"	399021191200
1-3/8"	399021191220
8-Jaw Kit	399031190801

Accessory Kit:

- Tubing cutter
- RLS depth gauge
- RLS press gauge
- Permanent marker
- Wire Brush (for jaw cleaning)
- Abrasive pad
- Deburring tool

Part Number: 399040102

Accessory kit is included in both 19 kN tool kits. 32 kN 8-jaw kit includes the depth gauge, press gauge, marker, brush and abrasive pad (no cutter or deburring tool).

Klauke® Tool and Jaw Kits

Each tool and jaw kit comes in a hard plastic carrying case. Tools sold in North America include two batteries and a battery charger (not included in kits sold outside North America). Batteries and chargers can be sourced from an RLS or Makita distributor.

North American Part Numbers

(Tools include 2 batteries and a charger.)

32 kN Tool (no jaws)
Part Number: 399011320001

19 kN Tool (no jaws)
Part Number: 399011190001

19 kN Tool and 5 Jaws
(3/8", 1/2", 5/8", 7/8", 1-1/8")
Part Number: 399011190501

International Part Numbers

(Tools do not include batteries or charger.)

32 kN Tool (no jaws)
Part Number: 399011320002

19 kN Tool (no jaws)
Part Number: 399011190002

19 kN Tool and 5 Jaws
(3/8", 1/2", 5/8", 7/8", 1-1/8")
Part Number: 399011190502

Jaw Kits

32 kN 8-Jaw Kit
(1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1-1/8", 1-3/8")
Part Number: 399031320801

19 kN 8-Jaw Kit
(1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1-1/8", 1-3/8")
Part Number: 399031190801

RIDGID® Jaws

Size	Part Number
1/4"	399022001040
5/16"	399022001050
3/8"	399022001060
1/2"	399022001080
5/8"	399022001100
3/4"	399022001120
7/8"	399022001140
1-1/8"	399022001180
1-3/8"	399022001220

RIDGID 8-Jaw Set

The RIDGID 8-Jaw Set comes in a hard plastic carrying case and includes a tube cutter, deburring tools, press gauge, depth gauge, stainless steel brush, abrasive pad and permanent marker. Jaw sizes include 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1-1/8" and 1-3/8". The 5/16" jaw is sold separately.

Part Number: 399032000801

RIDGID 6-Jaw Set

The RIDGID 6-Jaw Kit comes in a hard plastic carrying case and includes a tube cutter, deburring tool, press gauge, depth gauge, stainless steel brush, abrasivepad and permanent marker. Jaw sizes include 1/4", 3/8", 1/2", 5/8", 3/4" and 7/8".

Part Number: 399032001045

NOTE: *RIDGID press tools are sold through RIDGID distributors, available in lightweight pistol-grip and inline models.*

Accessories

Part Number	Description
399011000100	Klauke Replacement Tool Case
399031000100	Klauke Jaw Case
399032000100	RIDGID Jaw Case
399040307	1-1/4" Press Gauge
399040306	Press Gauge
399040308	Depth Gauge
399040301	Tube Cutter
399040302	Small Tube Deburing Tool (1/4" - 1-1/4")

Part Number	Description
399040309	Large Tube Deburing Tool (1/2" - 2")
399040303	Stainless Steel Brush
399040304	Abrasive Pad
399040305	Permanent Marker
399040101	Safety Kit (plastic bag, pen, instructions, crimp/depth gauges)
399040203	Makita 18V Charger - DC18RC
399040202	Makita 18V Battery - BL1815
399040201	Diagnostic tool - PGA1

Tool and Jaw Compatibility Matrix – 1/4" to 1-3/8" Fittings

			JAW MANUFACTURER				
			Klauke®			RIDGID®	Milwaukee®
TOOL MANUFACTURER	Model(s)	Size Range	15 kN	19 kN	32 kN	24 kN	32 kN
Klauke®	MAP2L	1/4" – 1-1/8"	✓				
	MAP2L19	1/4" – 1-3/8"		✓			
	UAP 332	1/4" – 1-3/8"			✓		✓
	UAP 432	1/4" – 1-3/8"			✓		✓
ROTHENBERGER pipetool technologies at work	Romax Compact	1/4" – 1-3/8"		✓			
	Romax 3000	1/4" – 1-3/8"			✓		✓
	Romax 4000	1/4" – 1-3/8"			✓		✓
NIBCO®	PC-20 M	1/4" – 1-1/8"	✓				
RIDGID	RP 115	1/4" – 1-1/8"	✓				
	RP 200 RP 210 RP 240 RP 241	1/4" – 1-3/8"				✓	
	RP 330 RP 340 RP 350 RP 351	1/4" – 1-3/8"			✓		✓
Milwaukee®	M12	1/4" – 1-3/8"				✓	
	M18 (excludes model 2674-20 short throw tool)	1/4" – 1-3/8"			✓		✓
viega	Pressgun Picco 6	1/4" – 1-3/8"				✓	
	Pressgun 6	1/4" – 1-3/8"			✓		✓
novopress because quality matters	ACO103	1/4" – 1-3/8"		✓			
	ACO203	1/4" – 1-3/8"			✓		✓
	ECO203	1/4" – 1-3/8"			✓		✓
	EFP203	1/4" – 1-3/8"			✓		✓
DEWALT	DCE200	1/4" – 1-3/8"			✓		✓

Only RLS-approved tools and jaws can be used to install RLS fittings.

Klauke® 32 kN Long-Throw Tool, Actuator and Collar Jaws (1-5/8" & 2-1/8")

Benefits:

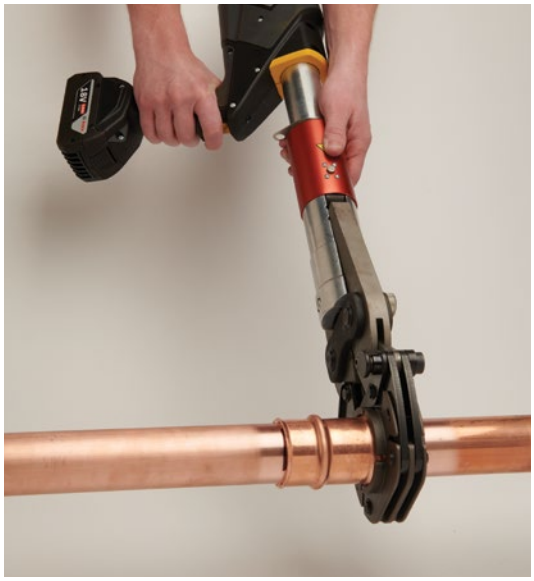
- Fast pressing cycle of less than 25 seconds
- 350° tool rotation for flexibility
- Automatic retraction saves time on multiple presses
- High safety factor thanks to "Quickstop" function
- Precise pressing force with audible signal
- Long battery and tool service-life
- Tool information shown via OLED display or i-press® app
- High-quality, powerful Li-Ion technology for long lasting operation (2 batteries and 1 charger included)

32 kN Long-Throw Tool Features:

Pressing Force: 32 kN
Presses/charge: 350-400 (4.0 Ah)
Battery Capacity:
18V / 4.0 Ah Li-Ion Makita (BL1840B)
Charging Time: 15 minutes
Operating Temp. Range:
-10°C to 40°C (14°F to 104°F)
Weight with Battery: 4.4 kg (9.7 lb)
Dimensions: 530 x 76 x 317 mm
Part Number: 399011329900

Accessories included with tool:

- Depth/press gauge
  Part Number: 399040501
- Permanent marker
- Wire brush
  (for collar jaw cleaning)
- Abrasive pad



Jaws:

2-1/8" Collar Jaw
Part Number: 399021321340

1-5/8" Collar Jaw
Part Number: 399021321260

Actuator Jaw
Part Number: 399021321000

Actuator Jaw is required and is used with both 1-5/8" and 2-1/8" collar jaws. Must be used with Klauke 32 kN Long Throw Tool.

"Overall, we've seen that most of our project times have been cut in half using RLS fittings. On bigger jobs, where it might have taken us two weeks to pipe a job in the past, it's only taken a week."

– Alex Bishoff
Howard Mechanical Services

Applications

- High Pressure HVAC/R
- Ethylene Glycol
- Non-Potable Water

Product Parameters

- Continuous Operating Temperature: 250°F / 121°C
- O-Ring Temperature Rating: -40°F to +300°F / -40°C to +149°C
- Maximum Allowable Working Pressure (MAWP): 700 psi / 48 bar
- Minimum Required Test Pressure (UL 207): 2,100 psi / 145 bar
- Vacuum Pressure Capability: <200 Microns
- External Helium Leak Rate: <7.5 x 10^{-7} Pa•m^3/s per ISO 14903
- Vibration Resistance: Conforms to UL 207
- Pull Test: Compliant with UL 207 for A1 fluids
- Size Availability (Inches): 1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-3/8, 1-5/8, 2-1/8

Fitting Materials

- Fitting Body: Refrigerant Grade Copper, per ASTM-B75 or ASTM-B743
- O-Ring: HNBR

Compatibility

- Approved Oils: Mineral Oil, POE, PVE, PAG
- Approved Tubing Materials: Copper-to-Copper Connections
- Approved Tubing Tolerance: ASTM B88/B280, EN 12735 & AS/NZS 1571
- Approved Copper Tubing Types for 32 kN Tool/Jaws
  - Hard/Drawn: 1/4" - 2-1/8" Type ACR, L, K
  - Soft/Annealed: 1/4" - 1-3/8" Type ACR, L, K
- Approved Copper Tubing Types for 19 kN and 24 kN Tool/Jaws
  - Hard/Drawn: 1/4" - 1-3/8" Type ACR, L, K
  - Soft/Annealed: 1/4" - 1-3/8" Type ACR, L, K
- Approved Copper Tubing Types for 15 kN Tool/Jaws
  - Hard/Drawn: 1/4" - 1-1/8" Type ACR, L; 1/4" - 7/8" Type K
  - Soft/Annealed: 1/4" - 1-1/8" Type ACR, L; 1/4" - 7/8" Type K

Agency Approvals and Certifications

- UL Listed: 207, SA#33958, SDTW (7) (Except where noted)
- UL Listed: Approved Use For Field & Factory Installations
- ISO 5149-2: Part 2 Compliant
- ASHRAE-15, ANSI 15, ASME B31.5 (504.7)
- ICC-ES, PMG-1296
- International Mechanical Code (IMC) 2021, 2018, 2015, 2012, 2009, 2006
- International Residential Code (IRC) 2021, 2018, 2015, 2012, 2009, 2006
- Uniform Mechanical Code (UMC) 2021, 2018, 2015, 2012, 2009, 2006
- CRN 0A22551 and 0A18303
- JCDA Certified

RLS Press Fitting Patents

- U.S. Patent No. 9,145,992
- U.S. Patent No. 9,638,361
- U.S. Patent No. D730,494
- Australian Patent No. 2012362443
- Brazilian Patent No. BR112014016012-0
- Canadian Patent No. 2,800,360
- Canadian Design Registration No. 149228
- EUIPO Registered Community Design No. 002218636-0001
- Japanese Patent No. 6051468
- Other Pending Patent Applications

RLS Press Tools and Jaws Patents

- Australian Design Registration No. 361533
- Canadian Design Registration No. 161804
- EUIPO Registered Community Design No. 002672667-0001
- Japanese Design Registration No. 1537545
- Other Pending Patent Applications

⚠ **WARNING:** Some of our ancillary products can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Prepare Tool and Installation Aids

1. Assure that all the tools and installation aids are available prior to beginning installation. The following list is to be used as a reference:
   - RLS fitting (Figure 1)
   - RLS approved press tool and jaws – sized appropriately (Figure 2)
   - RLS installation aids (Figure 3)
     - Deburring tool
     - Tube cutter
     - RLS depth gauge (may appear different than pictured)
     - Wire Brush (for jaw cleaning)
     - Permanent marker
     - RLS press gauge
     - Abrasive pad (can substitute 180 grit sand cloth or similar)

Figure 1

Figure 2

Figure 3

Inspect Fitting and Tube

2. To ensure the integrity of the joint, visually determine if the O-Rings are present and visually inspect the O-Rings for obvious damage such as nicks or tears. Caution: If an O-Ring appears to be damaged, is out of position, or is missing, DISCARD OLD FITTING AND USE A NEW ONE.
3. Perform a visual and tactile inspection of the tubing for surface imperfections referenced in ASTM B280, B88, or B1003 and the *Copper Tube Handbook* published by the Copper Development Association (CDA). Imperfections in and adjacent to the press or seal area could inhibit the joint integrity. These imperfections may include, but are not limited to:
   - Surface scratches
   - Incise marks (a required permanent mark of the tube manufacturer's name or logo)
   - Out of round (oval) on the cut ends
   - Production defects such as zippers
   - Dirt or debris
   - Items that may interfere with the O-Ring

   Should any of the above situations be identified, select a different area of the tubing. If necessary, cut off the portion with the imperfections.

Cut Tube

4. Cut the copper tube using the supplied or similar tube cutter (Figure 4). Ensure tube section to be pressed is straight. Caution: Do not proceed if the tube is cut at any visible angle other than 90 degrees or if the tube is not straight. Do not use a worn or damaged tube cutter, which can damage the tube and compromise the installation. This may lead to injury, equipment damage or failure of the system.

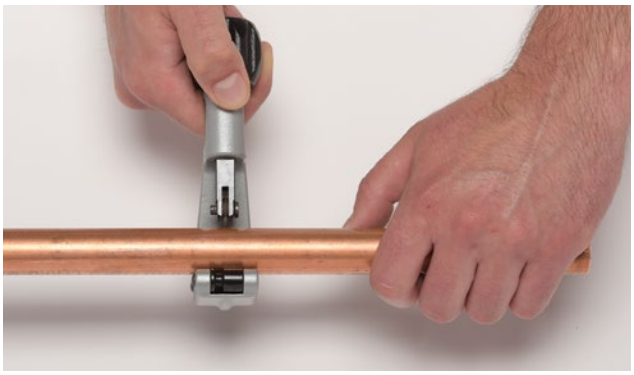


Figure 4

Prepare Tube

5. Use the deburring tool to remove any residual burrs from the outside and inside of the tube (Figure 5). Visual and tactile inspection should indicate no sharp edges or burrs remain. This is critical to avoid damaging or dislodging the O-Ring.

6. Use the included abrasive pad or adequate substitute (e.g. sand paper or sand cloth) to clean the end of the tubes to be joined (Figure 6). Tube ends should be free and clear of oxidation, dirt and debris. The surface should appear bright and shiny. Do not drop the tube, as this may cause damage and lead to improper installation. If the tube has been dropped, inspect it carefully and discard the tube if any damage is found.

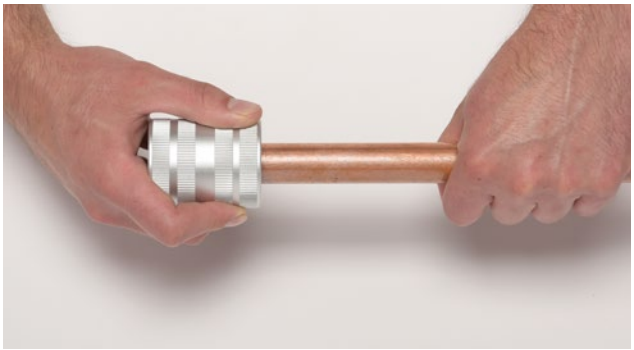


Figure 5

Figure 6

Connect Tube

7. Use the supplied depth gauge (Figure 7) or table below to mark inserted tube for insertion depth. Each tube must be marked to the correct insertion depth every time.

8. Push fitting onto tube and continue until the insertion marks are aligned with the end of the fitting. Make sure the tube is completely inserted into the fitting using the marks made in Step 7 (Figures 8 & 9).

Minimum Insertion Depth

Fitting Size	1/4" – 3/8"	1/2" – 1-1/8"	1-1/4" – 1-3/8"	1-5/8"	2-1/8"
Depth (in)	1	1-1/4	1-1/2	1-3/4	2-1/8
Depth (mm)	25.4	31.8	38.1	44.5	54.0

Figure 7

Note: It is possible that tube may be fully inserted and the marks may still be slightly visible as a result of the dimple and the accuracy of marks.

Note: Fitting installation should be relatively easy with little resistance felt. If it seems overly difficult to install the fitting, remove from tube and check to make sure the O-Ring hasn't been unseated. If this is the case, discard the fitting and use a new, replacement fitting.

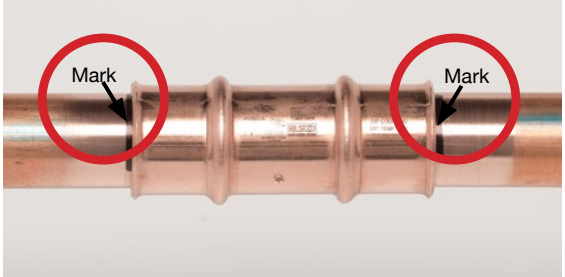


Figure 8

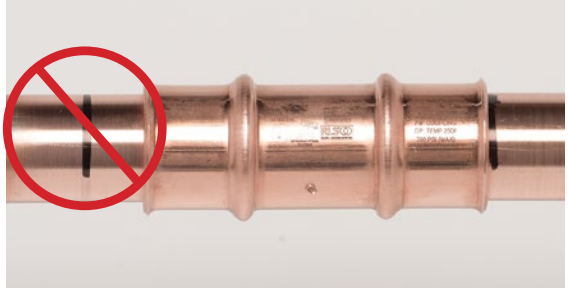


Figure 9

⚠WARNING

- Only RLS approved tools and jaws should be used to install RLS fittings.
- Failing to use the RLS approved jaws may result in property damage, serious injury or death.

9. Depress the pressing tool locking pin (Figure 10), then rotate 45° to release (Figure 11).

10. Slide the appropriate size jaw over the press tool head (Figure 12), then depress the locking pin until it clicks (Figure 13).

11. Slide the charged battery onto the base of the tool (Figure 14). Press and hold the trigger on the tool until the cycle is completed to calibrate (Figure 15). Calibration is recommended every time a jaw is changed, prior to use.

Figure 10

Figure 11

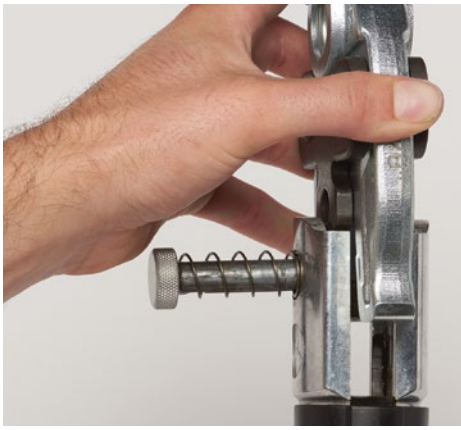


Figure 12

Figure 13

Figure 14

Figure 15

⚠WARNING

COPPER TUBE ENDS SHOULD BE INSPECTED AND ANY SHARP EDGES SHOULD BE REMOVED. SHARP EDGES MAY CAUSE DAMAGE TO THE O-Ring.

Note: For specific tool and jaw operation for pressing, refer to the manufacturer's instructions.

12. Press at the base of the jaws to open (Figure 16) and place the jaws onto the fitting as shown (Figure 17). Grooves in the jaw should line up and seat onto a groove located on the fitting. Ensure the tool is positioned between the flare and groove (Figure 18), NOT over the groove (Figure 19). Align the bottom portion of the jaw and the top portion will follow. SPECIAL ATTENTION SHOULD BE GIVEN TO THE CORRECT SEATING OF THE JAW.

13. Visually verify the inserted tube has remained in place and is still at the correct insertion depth as indicated by the mark (Figure 18).

Figure 16

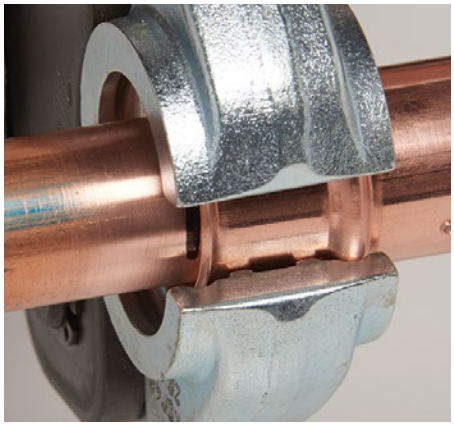


Figure 18

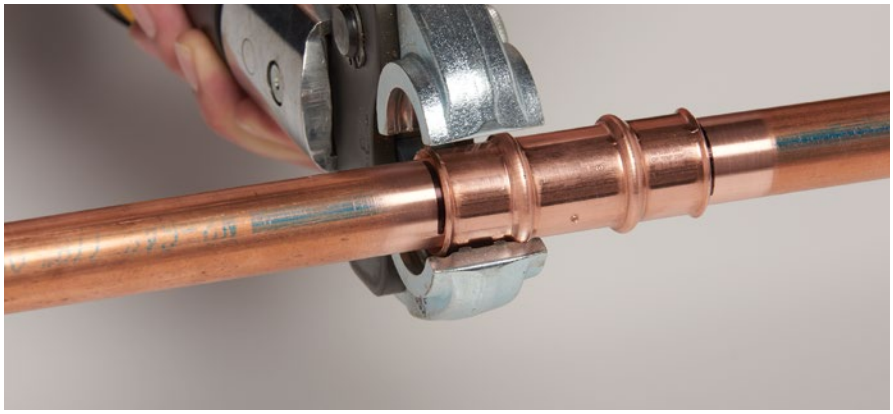


Figure 17

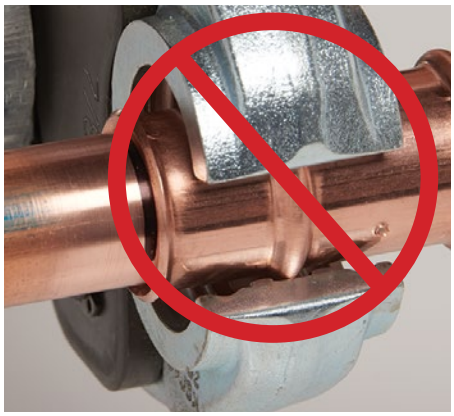


Figure 19

⚠WARNING

- **Keep hands and fingers away from jaws during use.**
- **Failing to keep hands and fingers away from jaws may lead to serious personal injury.**

Note: For specific tool and jaw operation for pressing, refer to the manufacturer's instructions.

14. Press and hold the trigger on the tool to begin the pressing process. Continue to hold the trigger until the tool completes its cycle (Figure 20). The jaws will not open until the cycle is completed without manual override. Repeat the process for the remaining fitting ends where appropriate.

    Note: For 1-3/8" fittings only (when using 19 kN or 24 kN jaws), after the 1st press, a 2nd press must be made with the 2nd press rotated at least 60° (approximate) from the 1st (Figure 21). When using 32 kN jaws, only one press is required. No other fittings are to be pressed twice.

15. Open the jaws and remove from the fitting. If the jaws do not open, the pressing cycle was not completed. For manual override, slide the manual release button down to open the jaw. If jaws stick to fitting, ensure the jaws are cleaned and apply a light amount of WD-40 to the jaw profile surface.

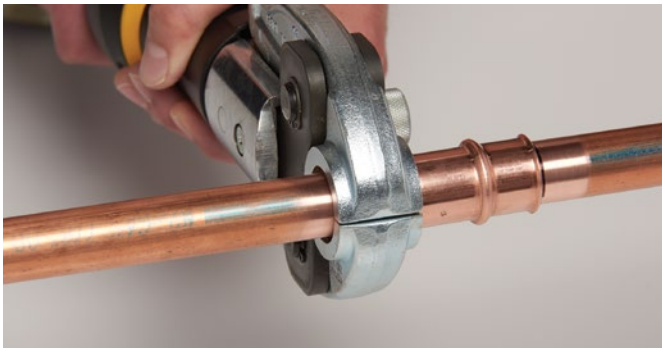


Figure 20

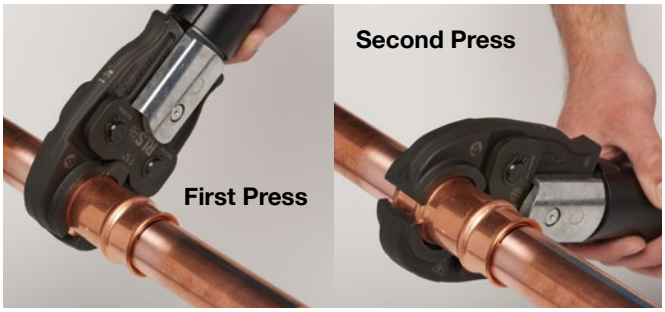


Figure 21

Verify Connection

16. To verify the press cycle was completed properly, a witness mark (RLS) will appear within the press bands (Figure 22). The mark will be more pronounced when pressed on hard tube vs. annealed tube but will be visible. Failure to create the witness mark either means an unauthorized jaw or the wrong sized jaw was used. It's also possible the jaw is dirty and the witness mark is filled with dirt/debris. If a fitting is incorrectly pressed then it must be removed and the procedure restarted with a new fitting.

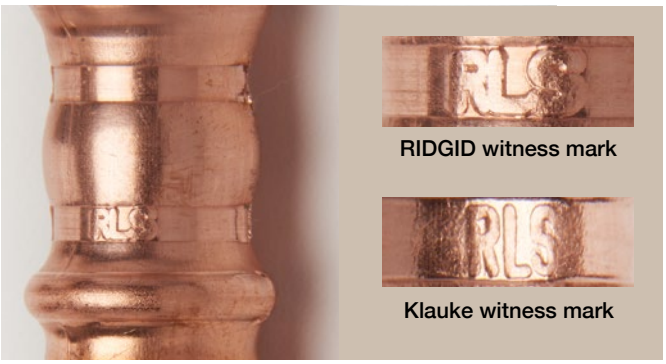


Figure 22

17. The RLS press gauge will confirm the finished press band diameter. The gauge is marked to align with the proper size fitting and press required. When the fitting is properly pressed, the RLS press gauge allows the marked slot to fit snug on the press band (Figure 23). If the press band is unable to fit within the marked slot on the gauge, it is under-pressed and will need to be re-pressed starting with Step 12.

Note: Flashing may be left over from the pressing process. If so, rotate the gauge so that the flashing is in line with the size marking when placed over the press bands. This will allow the diameter to be checked without interference from the flashing.

Use caution – flashing may be sharp.

Minimum Distance From Braze to Nearest Fitting End

Tube Diameter	1/4" – 1/2"	5/8"	3/4"	7/8" – 1"	1-1/8"	1-1/4" – 1-3/8"	1-5/8"	2-1/8"
Distance (in)	5	7	8	9	12	14	16-1/4	21-1/4
Distance (mm)	127	178	203	229	305	3556	413	540

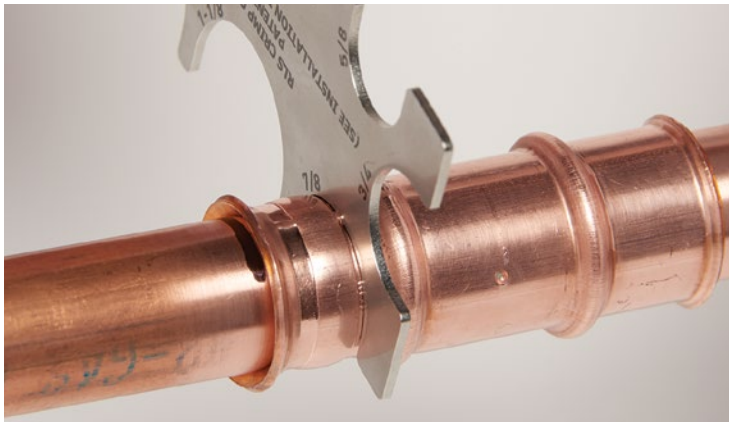


Figure 23

SAFETY INSTRUCTIONS

- **Do not rest the weight of the tool on the tube or fitting.**
- **Periodically check to ensure the jaws are meeting and aligned.**
- **Do not leave battery on charger unattended or overnight.**
- **Use brush to ensure jaws are debris free.**
- **Do not braze or solder within distance indicated in the chart above.**

Note: For specific tool and jaw care and maintenance, refer to the manufacturer's instructions.

Prepare Tool and Installation Aids

1. Assure that all the tools and installation aids are available prior to beginning installation. The following list is to be used as a reference:
   - RLS fitting (Figure 1)
   - RLS approved press tool, actuator jaw and collar – sized appropriately (Figure 2)
   - RLS installation aids (Figure 3)
     - Depth/press gauge
     - Abrasive pad
     - Wire brush
     - Permanent marker
     - Tube cutter (not provided by RLS)
     - Deburring tool (not provided by RLS)

Figure 1

Figure 2

Figure 3

Inspect Fitting and Tube

2. To ensure the integrity of the joint, visually determine if the O-rings are present and visually inspect the O-rings for obvious damage such as nicks or tears. Caution: If an O-ring appears to be damaged, is out of position, or is missing, DISCARD OLD FITTING AND USE A NEW ONE.
3. Perform a visual and tactile inspection of the tubing for surface imperfections referenced in ASTM B280, B88, or B1003 and the *Copper Tube Handbook* published by the Copper Development Association (CDA). Imperfections in and adjacent to the press or seal area could inhibit the joint integrity. These imperfections may include, but are not limited to:
   - Surface scratches
   - Incise marks (a required permanent mark of the tube manufacturer's name or logo)
   - Out of round (oval) on the cut ends
   - Production defects such as zippers
   - Dirt or debris
   - Items that may interfere with the O-ring

   Should any of the above situations be identified, select a different area of the tubing. If necessary, cut off the portion with the imperfections.

Cut Tube

4. Cut the copper tube using a tube cutter (Figure 4). Ensure tube section to be pressed is straight. Caution: Do not proceed if the tube is cut at any visible angle other than 90 degrees or if the tube is not straight. Do not use a worn or damaged tube cutter, which can damage the tube and compromise the installation. This may lead to injury, equipment damage or failure of the system.

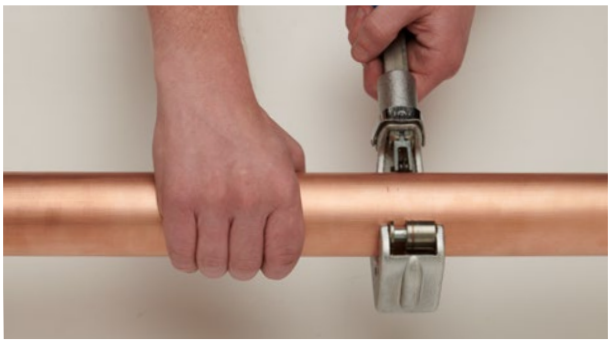


Figure 4

Prepare Tube

5. Use a deburring tool to remove any residual burrs from the outside and inside of the tube (Figure 5). Note: it may be necessary to use a metal file to remove remaining burrs. Visual and tactile inspection should indicate no sharp edges or burrs remain. This is critical to avoid damaging the O-ring.
6. Use the included abrasive pad or adequate substitute (e.g. sand paper or sand cloth) to clean the end of the tubes to be joined (Figure 6). Tube ends should be free and clear of oxidation, dirt and debris. The surface should appear bright and shiny. Do not drop the tube, as this may cause damage and lead to improper installation. If the tube has been dropped, inspect it carefully and discard the tube if any damage is found.

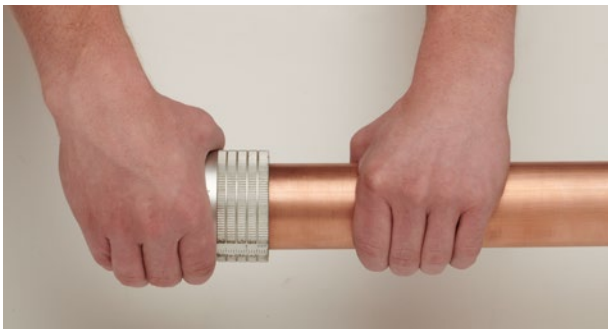


Figure 5

Figure 6

Connect Tube

7. Use the supplied depth/press gauge (Figure 7) or table below to mark inserted tube for insertion depth. Each tube must be marked to the correct insertion depth every time.

8. Push fitting onto tube and continue until the insertion marks are aligned with the end of the fitting. Make sure the tube is completely inserted into the fitting using the marks made in Step 7 (Figures 8 & 9).

Minimum Insertion Depth

Fitting Size	1-5/8"	2-1/8"
Depth (in)	1-3/4	2-1/8
Depth (mm)	44.5	54.0

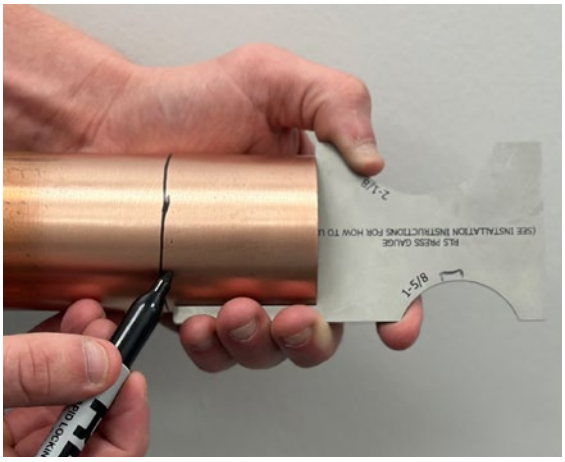


Figure 7

Note: It is possible that the tube may be fully inserted and the marks may still be slightly visible as a result of the dimple or accuracy of marks.

Note: Fitting installation should be relatively easy with little resistance felt. If it seems overly difficult to install the fitting, remove from tube and check to make sure the O-ring hasn't been unseated. If this is the case, discard the fitting and use a new, replacement fitting.

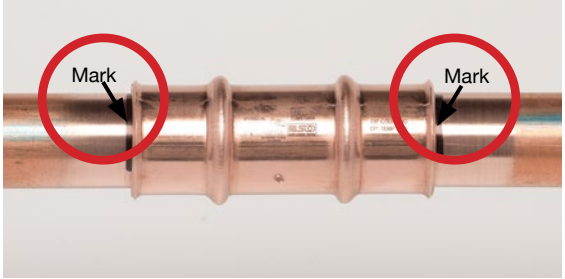


Figure 8

⚠WARNING

- Only RLS approved tools and jaws should be used to install RLS fittings.
- Failing to use the RLS approved jaws may result in property damage, serious injury or death.

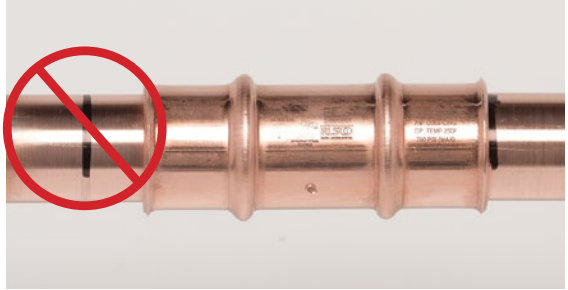


Figure 9

9. Press the tool locking pin and rotate 45° to release. Then slide the actuator jaw in to the press tool head (Figure 10) and depress the locking pin until it clicks (Figure 11).

10. Slide the charged battery onto the base of the tool (Figures 12 and 13). Press and hold the trigger on the tool until the cycle is completed to calibrate. Calibration is recommended every time a jaw is changed, prior to use.

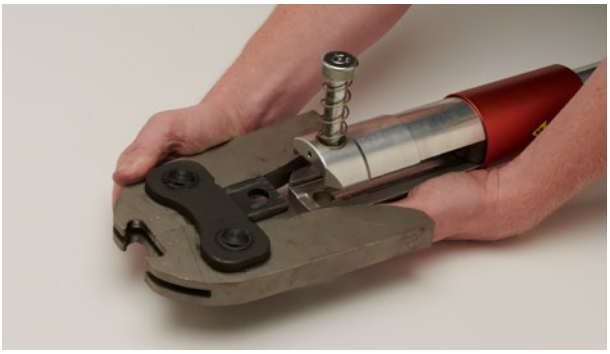


Figure 10

Figure 11

Figure 12

Figure 13

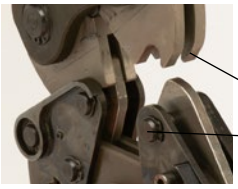
⚠ WARNING

COPPER TUBE ENDS SHOULD BE INSPECTED AND ANY SHARP EDGES SHOULD BE REMOVED. SHARP EDGES MAY CAUSE DAMAGE TO THE O-Ring.

Note: For specific tool and jaw operation for pressing, refer to the manufacturer's instructions.

11. Choose the appropriate size collar and unlock the collar by pulling out the locking pin. Wrap the collar around the fitting to be pressed, lining up the grooves in the collar with the O-ring groove and the flare on the end of the fitting (Figures 14 and 15). Then push the locking pin back into place until it clicks (Figure 16).

12. Hook the bottom prongs of the actuator jaw onto the bottom connection pins of the collar, then lean the tool forward and hook the top prongs onto the top connection pins (Figures 17-19). Before proceeding, assure that both actuator jaw prongs are fully over both connection pins.



Note: *Refer to the manufacturer's instructions for specific tool and jaw operation.*

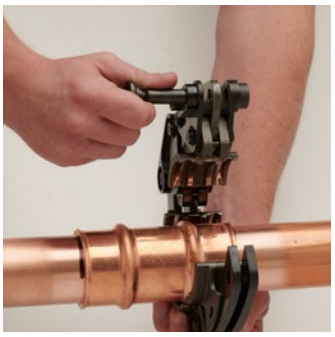


Figure 14

Figure 15

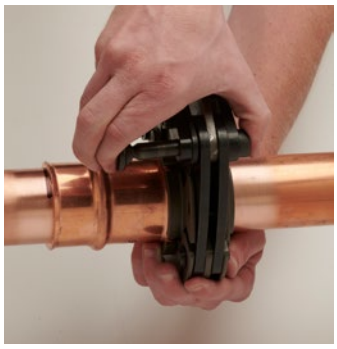


Figure 16

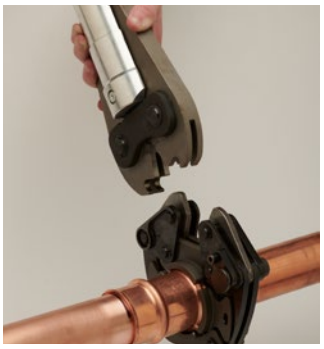


Figure 17

Figure 18

Figure 19

13. Press and hold the trigger on the tool to begin the pressing process. Continue to hold the trigger until the tool completes its cycle (Figure 20). The actuator jaw will not open until the cycle is completed without manual override. Repeat the process for the remaining fitting ends where appropriate.
14. Squeeze the base of the actuator jaw to release it from the collar.
15. Pull out the locking pin on the collar and remove the collar from the fitting.

Figure 20

Verify Connection

16. To verify the press cycle was completed properly, a witness mark (RLS) will appear within the press bands (Figure 21). Failure to create the witness mark means the fitting is pressed incorrectly. If the witness mark cannot be seen, the fitting must be removed and the procedure must be restarted with a new fitting.

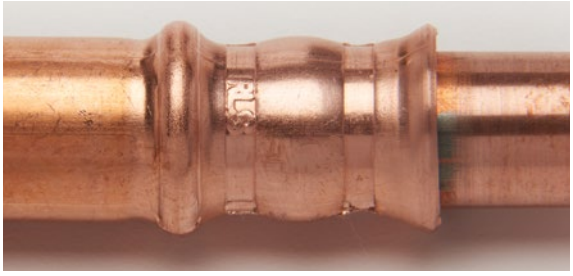


Figure 21

17. The RLS depth/press gauge will confirm the finished press band diameter. The gauge is marked to align with the proper size fitting and press required. When the fitting is properly pressed, the RLS press gauge allows the marked slot to fit snug on the press band (Figure 22). If the press band is unable to fit within the marked slot on the gauge, it is under-pressed and will need to be re-pressed starting with Step 11.

Note: Flashing may be left over from the pressing process on hard tube. If so, rotate the gauge so that the flashing is in line with the size marking when placed over the press bands. This will allow the diameter to be checked without interference from the flashing.

Use caution – flashing may be sharp.

Minimum Distance From Braze to Nearest Fitting End

Tube Diameter	1-5/8"	2-1/8"
Distance (in)	16-1/4	21-1/4
Distance (mm)	413	540

Figure 22

SAFETY INSTRUCTIONS

- **Do not rest the weight of the tool on the tube or fitting.**
- **Periodically check to ensure the collars are meeting and aligned.**
- **Do not leave battery on charger unattended or overnight.**
- **Ensure actuator jaws and collars are debris free.**
- **Do not braze or solder within distance indicated in the chart to the left.**

Note: *For specific tool care and maintenance, refer to the manufacturer's instructions.*

Effective Date: January 2023

PMG-1296

CSI: DIVISION: 23 00 00 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

Section: 23 20 00 – HVAC Pipe and Fittings

Product certification system:
The ICC-ES product certification system includes testing samples taken from the market or supplier's stock, or a combination of both, to verify compliance with applicable codes and standards. The system also involves factory inspections, and assessment and surveillance of the supplier's quality system.

Products:
Refrigeration Tubing Connectors

Listee:
RLS LLC
101 S. Douglas Street
Shelbina, MO 63468
www.rapidlockingsystem.com

Compliance with the following codes:
2021, 2018, 2015, 2012, 2009 and 2006 International Mechanical Code® (IMC)
2021, 2018, 2015, 2012, 2009 and 2006 International Residential Code® (IRC)
2021, 2018, 2015, 2012, 2009 and 2006 Uniform Mechanical Code® (UMC)*
**Copyrighted publication of the International Association of Plumbing and Mechanical Officials.*

Compliance with the following standards:
UL 207 (Edition 8), Standard for Refrigerant-Containing Components and Accessories, Nonelectrical

Identification:
The refrigerant tubing connectors shall be legibly and permanently marked with the manufacturer's name, trade name, trademark, or identifying symbol or other descriptive marking by which the organization responsible for the product may be identified. The shipping carton, a separate instruction sheet included with the shipping carton or a tag attached to the component shall include a distinctive model, part number, or type designation for the connector and include information for each refrigerant type for which the connector is intended and the ICC-ES PMG listing mark.

Installation:
The refrigerant tubing connectors must be installed in accordance with the manufacturer's published installation instructions, the applicable codes and this listing. Mechanical joints shall not be used on annealed temper copper tube in sizes larger than 7/8-inch (22.2 mm) OD size per IMC and 3/4 of an inch nominal size per UMC.
Note: The 2021 and 2018 IMC, IRC and UMC permit for press-connect joints listed for refrigeration piping.

Models:
The refrigerant tubing connectors are intended for connection of copper, aluminum, titanium and other types of tubing approved by the manufacturer. The connection is accomplished by compressing (solder-free) the fitting to a pipe. The refrigerant connectors are only suitable with the following refrigerants (R134A, R404A, R407, R410A, R417A, R421A, R422, R424A, R427A, R434A, R437A, R438A, R448A, R449, R450A, R452, R453A, R456A, R507, R513, R718, Ethylene Glycol).

***A copy of the actual ICC-ES report can be found on our website.**

Series Model Name: RLS Cu

Type of Connector	Sizes (Inches)
Couplings	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-3/8, 1-5/8, 2-1/8
Slip Couplings	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1-1/8, 1-3/8
Long Radius 90°	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-3/8, 1-5/8, 2-1/8
Long Radius 45°	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1-1/8, 1-3/8, 1-5/8, 2-1/8
Street 90°	1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1-1/8, 1-3/8
Stubs	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1-1/8, 1-3/8
Reducers (F x F)	1-3/8 x 1-1/8, 1-3/8 x 7/8, 1-1/8 x 7/8, 1-1/8 x 3/4, 1-1/8 x 5/8, 1-1/8 x 1/2, 1 x 7/8, 7/8 x 3/4, 7/8 x 5/8, 7/8 x 1/2, 3/4 x 5/8, 3/4 x 1/2, 5/8 x 1/2, 5/8 x 3/8, 5/8 x 1/4, 1/2 x 3/8, 1/2 x 1/4, 3/8 x 1/4, 5/16 x 1/4, 11mm x 3/8, 1-5/8 x 1-1/8, 1-5/8 x 1-3/8, 2-1/8 x 1-3/8, 2-1/8 x 1-5/8
Tees	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/14, 1-3/8, 1-5/8, 2-1/8
Bushing (B x F)	1-3/8 x 1-1/8, 1-1/8 x 7/8, 7/8 x 3/4, 3/4 x 5/8, 5/8 x 1/2, 1/2 x 3/8
Cap	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-3/8
SAE (Euro) Flare	1/4, 3/8, 1/2, 5/8, 3/4
Capillary Coupling	0.072 x 1/4, 0.109 x 1/4
Return Bend	1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1-1/8

Ratings

Sizes	Design Pressure, psig	Maximum Abnormal Pressure, psi	Continuous Operating Temperature
1/4" RLS	700	700	250°F (121°C)
5/16" RLS	700	700	250°F (121°C)
3/8" RLS	700	700	250°F (121°C)
1/2" RLS	700	700	250°F (121°C)
3/4" RLS	700	700	250°F (121°C)
5/8" RLS	700	700	250°F (121°C)
7/8" RLS	700	700	250°F (121°C)
1" RLS	700	700	250°F (121°C)
1-1/8" RLS	700	700	250°F (121°C)
1-1/4" RLS	700	700	250°F (121°C)
1-3/8" RLS	700	700	250°F (121°C)
1-5/8" RLS	700	700	250°F (121°C)
2-1/8" RLS	700	700	250°F (121°C)

Conditions of Listing:

1. The refrigerant tubing connectors must be used with only the following refrigerants (R134A, R404A, R407, R410A, R417A, R421A, R422, R424A, R427A, R434A, R437A, R438A, R448A, R449, R450A, R452, R453A, R456A, R507, R513, R718, Ethylene Glycol).
2. Mechanical joints shall not be used on annealed temper copper tube in sizes larger than 7/8 inch (22.2 mm) OD size per IMC and 3/4 of an inch nominal size per UMC.
   Note: The 2021 and 2018 IMC, IRC and UMC permit for press-connect joints listed for refrigeration piping.
3. The installation must be pressure-tested for leaks in the presence of the code official or the code official's designated representative.
4. When installation is in fire-resistance-rated assemblies, evidence must be provided to the code official of compliance with *International Building Code*® (IBC) Section 713 (penetrations), *Uniform Building Code* (UBC) Section 709 (walls and partitions) or UBC Section 710 (floor/ceiling or roof/ceiling), as applicable.
5. The connectors must not be used as a source of electrical ground.
6. When the system is embedded in concrete, tubing must be covered a minumum of 3/4 inch (19.1 mm) and installation must comply with IBC Section 1906.3 or UBC Section 1906.3, as applicable.
7. The refrigerant tubing connectors are under a quality control program with surveillance inspections annually by ICC-ES.

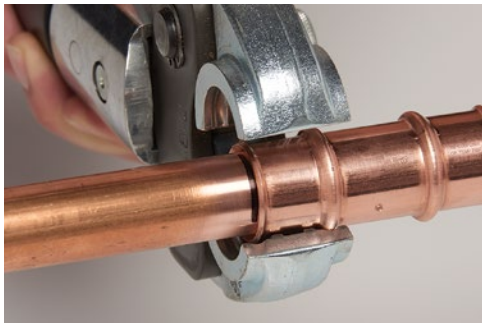
Time and Motion Study

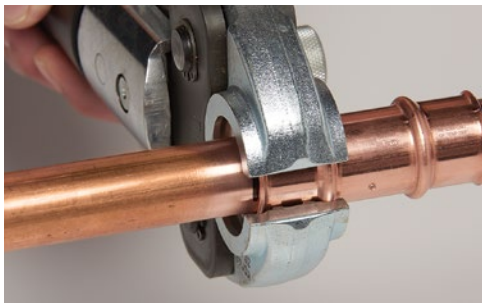
Conducted by:
Jay Peters, Principal Advisor, Codes and Standards International

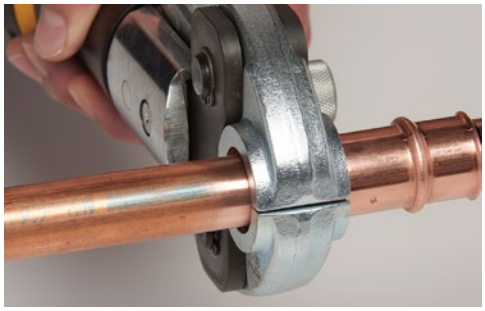
Methodology:

A time study was conducted in a controlled environment, with two stations set up for joining refrigeration tube: one by brazing and one by making RLS press connections. Two different installers were used, one very experienced in making brazed connections and one very experienced in using RLS approved press tools.

The two installers were timed independently making connections using various sized copper tube and fittings. Before timing began, tube was cut to length and the ends were prepared for connection (as these procedures are the same for both connection methods). Three connections were timed for each size of tube/fitting for each installer, and the three times were averaged. The results are shown in the table below.







LABOR TIME FOR INSTALLING A COPPER COUPLING

Fitting Size	1/4"	5/8"	1-1/8"
Brazed Connection	35 sec	42 sec	1:51 min
RLS Connection	24 sec	24 sec	25 sec
% Time Savings	31%	43%	77%

Key Findings and Conclusions:

The time savings achieved while joining tube using RLS press fittings, compared to brazed connections, ranged from 31% on the smallest fittings timed to 77% on the largest. The average time savings over the fitting sizes timed was approximately 50%. So, on average, RLS connections were made in roughly half the time of brazing — and in less than one-quarter the time on the largest fitting size.

Based on the study, brazed connections take longer to complete than RLS fitting connections. When analyzing the installation techniques for both connections, a brazed connection requires a period of time to raise the temperature of the fitting and tube to about 1000˚ F. As the tubing and fitting increases in diameter, the amount of time it takes to heat them also increases. The RLS fittings only require the connection of a press connect tool, which takes less than ten seconds to complete the actual pressing operation (two presses) — and the time to connect does not increase significantly as the diameter of tubing and fittings increase in size.

In a controlled environment, such as the work station where the time study was conducted, the brazing operation takes less time than a similar joint made on a construction or repair project in the field. The controlled environment is already set up for brazing, with all necessary equipment and materials close at hand. However, using the RLS press tool and fittings requires approximately the same amount of time in any environment. Therefore, it can be assumed that the RLS time savings would be even greater outside of a controlled environment.

Helium Leak Test

Conducted by:
Jim Busch, Project Engineer, EWI

Methodology:

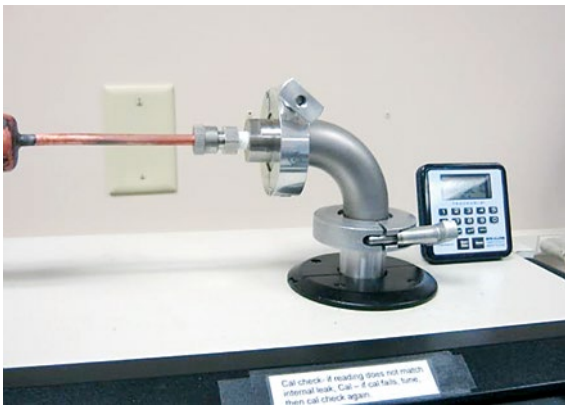
Six different RLS fitting sizes were connected to commercially available ACR tubing. Thirty union connections were chosen as a sample lot, with two connections per fitting. Each sample connected two pieces of tubing approximately nine inches long. One of the tubes was brazed shut at one end and the other tube was reduced to a 1/4" tube stub.

Prior to testing each lot of samples, the Veeco MS-40 helium leak tester was calibrated. After calibration, a solid ¼1/4" dowel was tested to verify the integrity of the seals on the helium leak test fixture. The 1/4" tube stub was wiped down with methanol and connected to the leak detector via a Swagelok 1/4" Ultra-Torr vacuum fitting. Each sample was pumped down to a level of approximately 500 millitorr prior to applying helium gas near the RLS press joint (at atmospheric pressure). The helium leak rate was measured and recorded for each of the 60 connections in a 30 piece sample lot.

Key Findings and Conclusions:

The maximum leak rate of all connections is summarized in the following table. The maximum leak rate detected was 5.40E-09 std.cc/sec.

Maximum Leak Rate per Lot						
Tube O.D. (inches)	0.250	0.313	0.375	.750	0.875	1.125
Maximum Helium Leak (std.cc/sec)	4.00E-10	6.10E-10	1.30E-09	5.20E-09	5.40E-09	3.00E-10



Test Set-up

Accelerated Durability Testing

Conducted by:
Chad Bowers, Creative Thermal Solutions, Inc.

Methodology: Three tests were devised to accelerate mechanical fatigue on RLS refrigeration press fittings, to simulate real world extreme conditions and determine possible failure modes. A total of 6 different fitting sizes between 1/4" and 1-1/8" were subjected to the tests.

Accelerated Frost/Defrost Simulation
Field failures of brazed joints have been detected due to water being trapped in tight spaces and expanding during freezing, causing high stress on brazed joints and joining methods. To test RLS fittings in this environment, an accelerated freeze/thaw test was performed in a controlled laboratory environment. A total of 16 RLS fittings representing 6 different sizes were repeatedly cycled in a humid environment from 50°F down to -40°F to simulate the water freezing and thawing in the vicinity of a pressed RLS fitting.

Accelerated Thermal Cycling
Accelerated thermal and pressure cycling was performed in a controlled laboratory environment. A total of 16 RLS fittings representing 6 different sizes were repeatedly cycled from high temperature and pressure to low temperature and pressure in a working air conditioning system utilizing R410A.

Vibration Durability Testing
To ensure durability in the presence of vibration induced fatigue, a test was conceived to simulate mechanically induced field vibration in refrigerant carrying tubes. This vibration test procedure was performed in a controlled laboratory environment. A sample of pressurized RLS fittings were subjected to a series of 1 million cycles each.

Key Findings and Conclusions:

Accelerated Frost/Defrost Simulation
The freeze/thaw test loop was allowed to run for over 5,000 cycles (nearly 28 days), simulating approximately 10 years of field operation. During the testing, the facility was shut down once each week to check the fittings for leaks. A similar leak check was performed at the end of testing as well, to confirm that no failures were caused by the testing. All leak checks were passed, with no indications of any form of failure as a result of this accelerated test.

Accelerated Thermal Cycling
The thermal cycling test facility was allowed to run until a total of 85,000 thermal cycles were imposed on the set of 16 RLS fittings. Periodic leak checks were performed over the course of testing to ensure that the fittings' sealing capabilities were intact. Upon completion of thermal cycling, a final leak check was performed, using soap water, indicating that the thermal and mechanical fatigue imposed on the fittings was insufficient to cause a failure in any of the fittings.

Vibration Durability Testing
The accelerometer data showed the up and down motion from the oscillating support causes a very consistent acceleration of approximately +/- 1g on all fittings. The primary frequency occurs at the 28.5HZ provided by the motor, with a very small amount of power occurring in the second harmonic. All of the fittings tested were pressurized to 400 psi and cycled for 1 million times, as described above. All of the fittings maintained pressure over this test period, indicating resilience to vibrational loading.

Corrosion Test

Conducted by:
Jeremy L. Lewis, Touchstone Research Laboratory, Ltd.

Methodology:

A total of 41 RLS refrigeration press fittings were provided to Touchstone Research Laboratory for SWAAT corrosion testing according to instructions provided in ASTM G85, Standard Practice for Modified Salt Spray (Fog) Testing, Annex A3 Acidified Synthetic Sea Water Test.

Specimens were a mixture of copper and aluminum tubes with fittings and gauges. The tubes were pressurized to 400 psi using dry nitrogen and exposed for 1000 hours. After none of the samples had failed to lose pressure before the 1000-hour mark, the decision was made to continue the test to 2000 hours. Test interruptions consisted of 1-2 minute periods every day (excluding weekends) to collect fallout.

Key Findings and Conclusions:

All but one of the original 41 RLS fittings lasted the full exposure time of 2,000 hours. One specimen lasted approximately 1,915 hours and failed.

The RLS fittings did not corrode despite extended exposure to the harsh acidified salt solution. The specimens not only passed the 1,000-hour test, but also did not fail after 2,000 hours, except for the one sample that lasted approximately 1,915 hours.

Specimen placement in the test chamber at start of test.

Troubleshooting

1. What should I do to ensure that a fitting doesn't leak after pressing?

- Inspect tubing carefully and verify there are no scratches, incise marks, zippers or dents prior to tube cutting. Be careful when using a knife to cut off plastic shipping caps or insulation off copper tubes.
- Take time to cut the tubing properly using a tubing cutter. Rushing through the cutting process may cause dents and oval tubing, which can create leaks.
- Verify proper deburring and sanding/cleaning of tube surface per instructions.
- Verify proper tube insertion depth using provided insertion gauge. One gauge is provided with the tool kit or can be ordered separately. Refer to the "Minimum Insertion Depth" table on next page if you do not have a gauge.
- Verify the proper press diameter using the provided press gauge.
- Verify correct jaw is installed for the fitting you are trying to press.
- If jaw is sticking during press, try applying a light coating of spray lubricant such as WD-40 directly to the jaws.
- Let jaw and tool do the work. If the fitting is in a hard to reach place, it is important to let the tool body move freely.
- Avoid applying any sort of pulling or twisting of the tool during the press process.

2. What should I do if a fitting leaks after pressing?

If the fitting was recently pressed (15-20 minutes) prior to pressurization, it is possible the bubbles are a result of trapped air in the double press area that can leak out over time, and IS NOT a fitting leak. This is more likely to occur on smaller fittings.

Since the joint is a permanent one, if a fitting is leaking after this period it is best to remove the affected fitting and replace with a new one.

If fitting is to be returned for analysis, please ensure that there is AT LEAST 3 inches of tube on each end of the fitting so it can be analyzed and leak cause determined. Without sufficient tubing, fitting can't be tested and leak confirmed.

3. If a fitting leaks, can you just braze it in instead of cutting it out and having to add more pipe?

No, trying to braze the fitting will very likely melt the O-Ring material and thus introduce contaminants into the system that could cause other system issues.
THE FITTINGS SHOULD NEVER BE BRAZED.

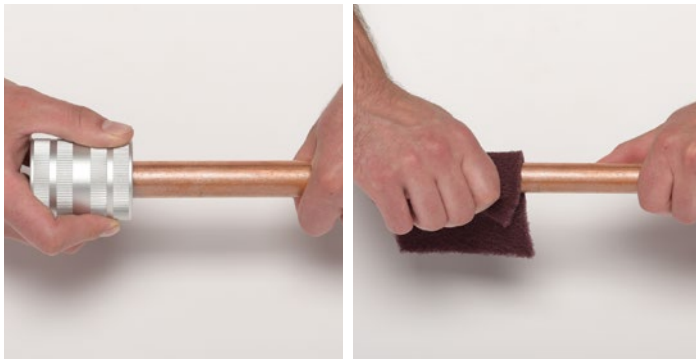
Installation

4. What is the most common cause of leaky fittings?

Skipping installation instructions 4 through 8 are the most common causes of leaks. It is very important to use the scouring pad and deburring tool. Refrigerant gas running at high pressure is more likely to leak than water at a much lower pressure, therefore, following the tube preparation instructions is critical.

5. What is a "deep" scratch and how can I remove it?

A deep scratch is defined as one that can be felt with your fingernail. To remove minor scratches try using a new piece of Scotch Brite abrasive pad (maroon color) or 400 grit sandpaper. Alternatively, 180 grit sandpaper/cloth can be used for 15-20 seconds to remove a deep scratch. Remember: sand/clean the tube surface around the tube not along the tube.



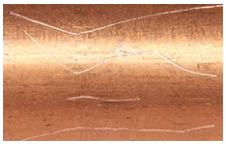
Following tube preparation steps 4 to 8 in the RLS installation instructions is important for preventing leaks.

6. How do you slide insulation over RLS fittings if the flare grabs the insulation?

If the flare of the fitting tends to be a problem, you can smooth the transition over the fitting by adding duct or electrical tape around the flared edge of the fitting to the tube.

7. Can you show an example of a “good” copper tube surface after sanding?

The top photo below shows a properly prepped tube end. The three lower photos show tube defects/ damage. All three would need to be cut off, and the remaining tube deburred and sanded per the installation instructions.



Scratches

Incise mark

Zipper

8. How do I know the correct insertion depth when pushing the RLS fitting onto the copper tube?

Use the depth gauge provided or the “Minimum Insertion Depth” chart below to determine the correct insertion depth. Mark the tubing with a permanent marker to indicate proper insertion depth on every tube.

MINIMUM INSERTION DEPTH

Fitting Size	Inches	Millimeters
1/4	1	25.4
5/16	1	25.4
3/8	1	25.4
1/2	1-1/4	31.8
5/8	1-1/4	31.8
3/4	1-1/4	31.8
7/8	1-1/4	31.8
1	1-1/4	31.8
1-1/8	1-1/4	31.8
1-1/4	1-1/2	38.1
1-3/8	1-1/2	38.1
1-5/8	1-3/4	44.5
2-1/8	2-1/8	54.0

9. How do I press onto the flared tubing that comes out of the condenser and evaporator on residential units?

We do not have a specific product designed to press over this type of flared tubing. However, if there is at least 3 inches of straight copper tubing after the flared end is removed, and it is accessible with the jaws, we suggest that you cut the flared end off and press directly to the tube. It is important to measure the straight section of tube, prior to cutting, to ensure the diameter is within tolerance and will work with the fitting. Reference the standards in item #10 for size ranges.

10. How much tolerance can the RLS fitting handle on the pipe being pressed?

We know that not all copper tubing is the same, but we have tested RLS with most copper tube manufacturers with no issues. The tolerance for each tube to ensure a leak-free joint is defined by ASTM B280, B88 or B1003.

11. What is the minimum brazing distance?

Brazing tubing after a fitting has been pressed should be avoided at all costs. When absolutely necessary to do so, refer to the chart below for the minimum distance to leave between a pre-pressed fitting and a brazed joint. When field brazing, conventional precautions should be taken to ensure the pressed fitting remains cool, including making sure purge gas flows away from the pressed fitting (to avoid exposing the seal to hot gas). Pre-brazed joints only need a minimum distance of 4"-5" from RLS fittings to allow for jaw fit.

MINIMUM DISTANCE FROM RLS FITTING TO BRAZE

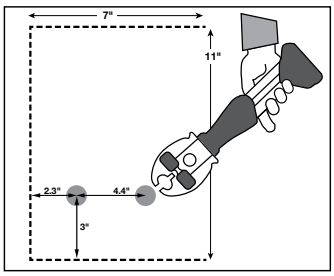
Tube Diameter	Inches	Millimeters
1/4 to 1/2	5	127
5/8	7	178
3/4	8	203
7/8 to 1	9	229
1-1/8	12	305
1-1/4 to 1-3/8	14	356
1-5/8	16-1/4	413
2-1/8	21-1/4	540

12. What is the minimum distance between RLS fittings?

The ends of the fittings should be no closer than 1/2" apart to allow space for the jaw to overhang.

13. What is the recommended minimum space (envelope) needed around the Klauke tool and jaws to press?

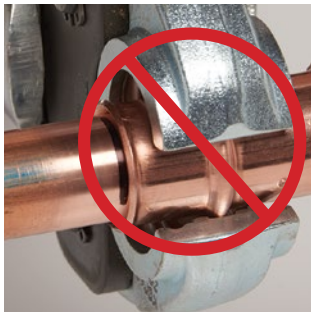
An envelope of 11" x 7" is recommended. The illustration below shows a closed space with one side open. For 1-3/8" couplings, a minimum of 4.4" is required between couplings (down to 3.3" for 1/4" couplings). A minimum of 2.3" from the back wall surface is required. You need 2.5" between couplings for jaws if the tool is coming up from below the fittings to press. Contact RLS with questions.



Press Tool

14. Can RLS fittings be pressed in the same location as Viega ProPress fittings?

No. The fittings will leak if you do not press per the RLS installation instructions. Proper pressing is also illustrated in the photo below.



15. How many presses can you complete on a complete battery charge?

On average, you can achieve 100-150 presses per charge with the 19 kN tool and 350-400 with the 32 kN tool, depending on the size of fittings being pressed. Each Klauke Tool Kit comes with 2 Makita Lithium-ion batteries and a rapid charge charging system. To prevent any downtime, it is recommended that you have both batteries charged before going to the job site, and to have one charging (or charged) while the other is in use.

16. How can I increase battery life?

You can purchase higher capacity batteries at your local or online retailers where batteries are sold.

17. How do you know when the tool needs to be serviced?

The Klauke tools have red LED lights on the back of the tool that will blink for 20 seconds after a press. If your tool needs servicing, please contact RLS.

18. What is the expected life of the jaws?

Each jaw has an expected life of 10,000 to 12,000 presses.

19. How do you know when the jaw needs to be replaced?

The contact point between the upper and lower jaw will start to open up/widen. A good indication of failure is when the press gauge no longer engages. Use the supplied wire brush in tool kit to periodically clean pressing jaws.

20. Where can replacement batteries and chargers be purchased?

Batteries can be purchased at your local or online retailers where batteries are sold.

Technical

21. What material is the O-Ring made of?

The O-Ring is a highly engineered HNBR O-Ring that has been used in HVAC applications by OEMs and suppliers for many years with no issues.

22. What is the expected life of the O-Ring in the system?

The O-Ring material used is the same as what is used in other refrigeration components, such as valves. Due to the nature of the static press sealing the O-Ring from outside air, in a properly working system the O-Ring should last as long as the system.

23. Does the O-Ring compensate for imperfections in the piping to make a tight seal?

Yes, the O-Ring does compensate for small/minor scratches on the surface of the tube; however, the tubing needs to be inspected prior to use per ASTM B280, B88, or B1003 and the *Copper Tube Handbook* published by the Copper Development Association (CDA) specifications. Imperfections in and adjacent to the press area could inhibit the joint integrity. These imperfections may include surface scratches, incise marks, tube zippers and out of round tubing.

24. Are there any shelf life concerns?

No, the shelf life of the HNBR O-Ring is estimated at or above 15 years.

25. Is there a concern about ice building up and then thawing under fittings in a horizontal or vertical configuration?

No, RLS fittings have been thoroughly tested in freeze/thaw applications with over 10,000 cycles completed in both vertical and horizontal configurations with no leakage concerns.

26. Are there any concerns about corrosion due to harsh environments, cleaners or off-gassing of produce/vegetables?

RLS fittings have gone through extensive SWATT testing, completing over 2,000 hours of salt spray testing without failure, which proves the resilience of the product. Care should be given to avoid areas that could be exposed to ammonia or ammonia-like substances as ammonia is very corrosive to copper fittings and tubing.

27. The product specifications state that the application temperature limits are -40°F to +300°F / -40°C to 150°C. What happens if we go beyond that limit?

If the application that the fitting is being used in goes beyond the specified limits of the O-Ring (-40°F to +300°F / -40°C to 150°C) then there will be an increased likelihood that a leak can occur.

28. Can I use RLS fittings in a transportation application where vibration is high?

Yes. RLS fittings have gone through extensive vibration testing and results are as good as, if not better than, a brazed joint. Please review the vibration testing procedure and conclusion on page 28 for more information.

29. Can you use RLS refrigerant fittings to press to aluminum, steel or stainless steel?

No. RLS copper refrigerant fittings are specifically designed for copper-to-copper connections. Connecting to dissimilar metals can cause galvanic corrosion issues that could cause a failure.

Other

30. Are RLS fittings approved by state and city building codes?

RLS fittings have been approved by UL-207, ASHRAE 15, International Code Council – Evaluation Service (ICC-ES), International Mechanical Code (IMC), Universal Mechanical Code (UMC) and International Residential Code (IRC). Please contact your local building inspector with questions prior to install. Installers should check local codes to ensure fitting compliance prior to install.

31. Do RLS refrigerant fittings come with a warranty?

Yes. Our 15-year manufacturer's warranty states that RLS fittings shall be free from defects in material and workmanship. The warranty shall only be applicable to the RLS fittings installed in accordance with the installation instructions.

Part 1: General

1.0 SUMMARY

A. RLS flame-free refrigerant fittings are specially designed to join HVAC/R copper tubes without brazing. RLS is intended for HVAC/R applications.

B. RLS copper fittings include two pre-installed O-Rings. The system is assembled only using the approved Klauke®, RIDGID® or Milwaukee pressing jaws to create a permanent leak tight joint.

C. RLS fittings cannot be assembled using non-approved jaws, such as those used in plumbing. The installer shall be mindful that the press location of a RLS fitting is in a different location than the plumbing style press fittings.

D. RLS fittings and approved pressing tools and jaws are sold by authorized distributors/wholesalers.

E. RLS RIDGID pressing jaws are sold by authorized RLS and RIDGID wholesalers. RIDGID tools are sold by RIDGID authorized wholesalers. Milwaukee tools and jaws are sold by Milwaukee authorized wholesalers.

Part 2: Products

2.0 REFERENCES

A. UL 207: Standard for Refrigerant-Containing Components and Accessories, Nonelectrical

B. UL 109: Standard for Tube Fittings for Flammable and Combustible Fluids, Refrigeration Services, and Marine Use. Vibration Test 8.1

C. ASME B31.5: Refrigeration Piping and Heat Transfer Components

D. ASTM B75: Standard Specification for Seamless Copper Tube

E. ASTM B88: Standard Specification for Seamless Copper Water Tube

F. ASTM B743: Standard Specification for Seamless Copper Tube in Coils

G. ASTM B280: Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

H. ASTM B1003: Standard Specification for Seamless Copper Tube for Linesets

I. EN 12735-1: Copper and Copper Alloys. Seamless, round copper tubes for air conditioning and refrigeration. Tubes for piping systems.

J. ASHRAE-15: Safety Standard for Refrigeration Systems

K. ICC-ES, PMG-1296: Division 23 00 00-Heating, Ventilation and Air Conditioning

L. ISO 14903: Refrigerating Systems and Heat Pumps – Qualification of tightness of components and joints

M ICC: International Mechanical Code (IMC)

N. ICC: International Residential Code (IRC)

O. IAPMO: Uniform Mechanical Code (UMC)

P. CRN (Canadian Registration Number): 0A22551 and 0A18303

Q. RLS Catalog, RLS Engineering Submittal

2.1 PRODUCT PARAMETERS

A. Applications: HVAC/R, Glycol and Non-Potable Water

B. Continuous Operating Temperature: 250°F (121°C)

C. O-Ring Temperature Rating: -40 to 300°F (-40 to 149°C)

D. Maximum Allowable Working Pressure (MAWP): 700 psi / 48 bar

E. Minimum Burst Pressure: 2,100 psi (145 bar)

F. Vacuum Pressure Capability: <200 microns

G. External Helium Leak Rate: $<7.5 \times 10^{-7}$ Pa•m³/s per ISO 14903

H. Vibration Resistance: Conforms to UL 207

2.2 APPROVED REFRIGERANTS AND OILS

A. For the latest approved refrigerants refer to www.rapidlockingsystem.com

2.3 QUALITY ASSURANCE

A. All qualified installers shall be trained on the safe installation of RLS flame-free refrigerant fittings. They should also be licensed within the jurisdiction.

B. RLS fittings shall be installed using the proper tools and pressing jaws defined by the manufacturer.

C. Installation of HVAC/R copper tubing shall conform to the requirements of the International Mechanical and Residential Codes and Uniform Mechanical Code.

2.4 DELIVERY, STORAGE AND HANDLING

A. Do not stack boxes on top of boxed RLS fittings weighing more than 20 lbs. Do not place anything on top of loose fittings, as that will damage them. RLS fittings are annealed and more prone to damage.

B. When using a knife for unpacking, take special care not to scratch copper tubing or RLS fittings since this can lead to leaks.

C. RLS fittings and copper tubing shall be shipped to the job site in such a manner to protect the tubing and fittings. RLS fittings and tubing shall not be roughly handled during shipment. Tubing and fittings shall be unloaded with reasonable care.

D. Protect the stored products from moisture, dirt and debris. Maintain elevated above grade.

2.5 PROJECT CONDITIONS

A. Allow the Klauke tool to reach ambient temperature if it is stored for prolonged periods of time at extreme temperatures. The Klauke tool's operating temperature is 14° to 104°F. For other compatible press tools, consult the manufacturer's operating manual.

2.6 WARRANTY

A. RLS fittings shall be free from defects in material and workmanship. The 15-year warranty shall only be applicable to the RLS fittings installed in accordance with the installation instructions.

2.7 MANUFACTURERS

A. RLS fittings: RLS LLC, 6212 Pershall Rd., Hazelwood, MO 63042. Website: www.rapidlockingsystem.com

2.8 MATERIAL

A. 32 kN Compatible Jaws:
- Hard/Drawn: 1/4" - 2-1/8" Type ACR, L, K
- Soft/Annealed: 1/4" - 1-3/8" Type ACR, L, K

B. 19 kN and 24 kN Compatible Jaws:
- Hard/Drawn: 1/4" - 1-3/8" Type ACR, L, K
- Soft/Annealed: 1/4" - 1-3/8" Type ACR, L, K

C. 15 kN Compatible Jaws:
- Hard/Drawn: 1/4" - 1-1/8" Type ACR, L; 1/4" - 7/8" Type K
- Soft/Annealed: 1/4" - 1-1/8" Type ACR, L; 1/4" - 7/8" Type K

D. Tubing: The installer shall confirm the copper tubing conforms to ASTM B280, B88, B1003 or EN 12735-1.

E. RLS Fitting Body: Conform to ASTM-B75, ASTM-B743, or ASTM-B152.

F. RLS Fitting Sealing O-Rings: HNBR or Neoprene (for R22 Applications Only). These shall be factory installed only.

G. RLS Compatible ODM Fittings: Materials conform to C12200 copper per ASTM B280 or Cu-DHP CW024A per BS EN 12735-1.

H. RLS SAE Threaded Fittings: Flare nuts conform to SAE J513 & SAE J533.

2.9 SOURCE QUALITY CONTROL

A. Confirm that RLS is in compliance with all local building codes.

B. RLS fittings are UL Listed (SA#33958, SDTW (7). (Except where noted)

C. RLS compatible ODM style fittings and other ancillary products may not be UL Listed (i.e. Y-fittings, P-traps, access fittings, etc).

Part 3: Execution

3.0 TRAINING

A. All installers shall be trained on RLS product installation by a qualified trainer. Contact your authorized distributor or sales representative for training. Online training is available at: training.rapidlockingsystem.com.

B. RLS installers shall verify they have all the installation tools and gauges included in the installation instructions.

3.1 SAFETY

A. Installers shall be made aware or reminded of the safety warnings highlighted at the end of this document.

3.2 EXAMINATION, PREPARATION & INSTALLATION

A. Installers shall follow all installation steps per the installation instructions. This covers examination, preparation and installation.

B. Upon delivery to the job site, the installing contractor shall examine the copper tubing and fittings for debris, defects, incise marks (manufacturer's engraving on tube), holes, cracks or zippers.

C. If brazing or soldering nearby, ensure proper sealing of the fitting by maintaining a minimum braze distance from connections. Refer to the table on page 23 for minimum distances from a fitting to a braze joint per tube size. The installer should take conventional precautions to keep the fitting cool by providing a heat sink (wet ragging, heat block, etc.) to ensure that the O-Ring is not damaged during brazing.

D. Installer will cut out tubing with deep incise marks.

E. The installer should use the provided insertion depth gage or alternatively reference the table on page 19 to determine the copper tube insertion depth.

F. Wrapping duct or electrical tape over the end of a flare fitting can be used when placing foam insulation over a pipe to prevent tearing.

G. The installer shall not press RLS fittings over flared style tubing (ODF). The installer can cut off the flare and press the RLS fitting to the tube as long as there is a minimum of 3 inches of tube remaining.

3.3 INSTALLATION GENERAL LOCATIONS

A. Plans indicate general location and arrangement of piping systems. Identified locations and arrangements are used to size tubing and calculate pressure drop and loss coefficients.

B. Installer shall ensure piping is spaced such that the press gauge can fit around the pipes to check for proper press.

C. Installer shall place RLS fittings no closer than 1/2" apart.

D. The installer shall locate the copper tubing such that the press tool and jaws can fit around the RLS fittings per the illustration on page 31 (Question 13).

3.4 FIELD QUALITY CONTROL

A. The copper tubing system shall be tested for joint tightness. This is done by ensuring EVERY press joint is checked with the press gauge, and that EVERY joint passes that check. Refer to Installation Instructions for how to properly use the press gauge.

B. System leak checks shall be done per the HVAC/R system manufacturer's instructions.

90° Elbow Pressure Drop in Equivalent Tube Length

The charts below show the significant effects 90° elbows can have on a pressure drop, based on the *2018 ASHRAE Refrigeration Handbook* (page 1.16). Note: R/D is defined as the bend radius (R) divided by the fitting tube OD (D). So a tube with 1/4" OD that has a 1/2" bend radius would have an R/D = 2.

		Equivalent Tube Length (ft.) per 90˚ Elbow		
Nominal OD	Actual OD	R/D = 1 (short radius)	R/D = 1.5 (long radius)	R/D = 2.0 (RLS) *approx.
3/8"	1/2"	1.40	0.90	0.72
1/2"	5/8"	1.60	1.00	0.80
3/4"	7/8"	2.00	1.40	1.12
1"	1-1/8"	2.60	1.70	1.36
1-1/4"	1-3/8"	3.30	2.30	1.84

		Equivalent Tube Length (ft.) Based on Ten 90˚ Elbows		
		R/D = 1 (short radius)	R/D = 1.5 (long radius)	R/D = 2.0 (RLS) *approx.
Nominal OD	Actual OD	10	10	10
3/8"	1/2"	14.00	9.00	7.20
1/2"	5/8"	16.00	10.00	8.00
3/4"	7/8"	20.00	14.00	11.20
1"	1-1/8"	26.00	17.00	13.60
1-1/4"	1-3/8"	33.00	23.00	18.40

*Approximate length for RLS elbow based on ~33% increase in R/D from the "long radius" 90˚ elbow.

WARNING – USER RESPONSIBILITY

Failure or improper selection or improper use of the products described herein or related items can cause death, personal injury and property damage. This document and other information from RLS LLC and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of theapplication are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from RLS LLC or its authorized distributors.

To the extent that RLS LLC or its authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

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Access Literature