Long Radius 90° Elbows are the Key to System Efficiency!

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When you're driving 70 miles per hour and come to a sharp turn, you have to slow down. The sharper the curve, the slower you have to go. Well, that's exactly what happens with fluid flowing through an HVAC/R system. And that's exactly why we designed our 90° elbows with a wide radius that maintains refrigerant flow and minimizes pressure drop.

Short radius elbows slow refrigerant flow and can cause system damaging pressure drops.

The facts about 90° elbows:

- RLS 90s were specifically designed for high-pressure HVAC/R systems (not plumbing).
- RLS 90s have the longest radius of any elbows on the market.
- Short radius 90s cause fluid to slow down and system pressure to drop.
- Lower system pressure means refrigerant and oils don't flow through the system as efficiently.
- Without adequate lubrication, system components wear out faster.
- To account for pressure drop, systems may need to be upsized, increasing cost.
- Depending on the refrigerant and system temperature, pressure drops can cause serious problems.
- The tighter the elbow radius, the greater the pressure drop (measured in equivalent tube length). Compared to short radius elbows, RLS 90° elbows result in up to half the equivalent tube length added (see explanation on page 2).
- Bottom line, RLS 90° elbows maximize efficiency and protect your system!

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As the length of tubing in a system increases, so does the pressure drop. Therefore, one way to compare pressure drop among similar components is to measure the drop as an equivalent length of tube. For example, adding a 7/8" short radius elbow to a system results in a pressure drop equal to adding 2 feet of tubing...while adding a 7/8" RLS long radius elbow is equivalent to just 1.12 feet of tube – a nearly 50% decrease in pressure drop.

While this may at first seem like a small amount, adding up all the elbows in an entire system can result in very significant pressure drop – the kind that can seriously impact system efficiency and/or result in equipment needing to be upsized.

See charts below for technical details on the significant effects of 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.

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