

Product Information Bulletin

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Alternate Liquid Lines on Residential R-410A Split System Air Conditioners

ICP has evaluated the use of 1/4" and 5/16" liquid lines for R-410A refrigerant air conditioner cooling-only systems. R-410A refrigerant lends itself well to the use of smaller liquid lines in either retrofit applications with existing linesets, or new systems when cost saving is a priority. 1/4" or 5/16" inch liquid lines may be used for cooling-only applications using a TXV as the metering device per limitations on Tables 2 and 3 on page 2 of this bulletin.

There are several benefits to the use of alternate liquid lines. These include lower install cost for replacement jobs when the existing linesets are not accessible for changeout, lower lineset cost for new installations, less refrigerant cost for longer linesets, and increased reliability due to less total refrigerant in the system. For examples of potential cost savings, see page 3 of this bulletin.

Limitations for alternate liquid lines are based on total equivalent line length and elevation difference between indoor and outdoor units. Use the appropriate table depending on whether the outdoor unit is above or below the indoor unit.

There are no capacity and efficiency differences between systems using 3/8" liquid lines and the listed alternate liquid lines at the equivalent lengths shown, provided a TXV metering device is used. The alternate liquid line sizes recommended in this bulletin follow the capacity loss charts in the Spec Sheets and, when used with a TXV, achieve the same SEER ratings as systems with 3/8 liquid lines. The capacity losses shown in the Specs Sheets are related to changes in suction line diameter and equivalent length.

Outdoor units are factory charged for 15 feet of 3/8" liquid line and include charge for the filter drier. Charge must be adjusted according to the lineset being used. See Table 1 for appropriate charge adjustments and examples for correct charge adjustment.

NOTE: Due to the added complexity of heat pump systems, further evaluation is needed before releasing guidelines for heat pump systems.

Table 1. Refrigerant Charge Adjustments

Liquid Line Size	R-410A Charge (oz/ft)
3/8"	0.60 (Factory charge for 15 ft lineset = 9 oz)
5/16"	0.40
1/4"	0.27

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Charging Formula:

(Lineset oz/ft x total length) – (factory charge for lineset) = charge adjustment

Example 1: System has 15 ft of line set using existing 1/4" liquid line.

What charge adjustment is required?

Formula: (.27 oz/ft x 15 ft) – (9 oz) = (-4.95) oz.

Net result is to remove 4.95 oz of refrigerant from the system

Example 2: System has 45 ft of existing 5/16" liquid line.

What charge adjustment is required?

Formula: (.40 oz/ft. x 45 ft) – (9 oz.) = 9 oz.

Net result is to add 9 oz of refrigerant to the system

Table 2. R-410A - Maximum Total Equivalent Length: Outdoor Unit BELOW Indoor Unit

Unit Size	Liquid Line Diameter (w/TXV)	Vertical Separation (ft) Outdoor unit BELOW indoor unit								
		0-5	6-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
18000	1/4	150	150	125	100	75	75	50	--	--
	5/16	250	250	250	250	250	250	250	225	150
24000	1/4	75	75	75	50	50	--	--	--	--
	5/16	250	250	250	250	250	225	175	125	100
30000	1/4	30	--	--	--	--	--	--	--	--
	5/16	175	225	200	175	125	100	75	--	--
36000	5/16	175	150	150	100	100	100	75	--	--
42000	5/16	125	100	100	75	75	50	--	--	--

Table 3. Puron - Maximum Total Equivalent Length; Outdoor Unit ABOVE Indoor Unit

Unit Size	Liquid Line Diameter (w/TXV)	Vertical Separation (ft) Outdoor unit ABOVE indoor unit							
		25	26-50	51-75	76-100	101-125	126-150	151-175	176-200
18000	1/4	175	250	250	250	250	250	250	250
	5/16	250	250	250	250	250	250	250	250
24000	1/4	100	125	175	200	225	250	250	250
	5/16	250	250	250	250	250	250	250	250
30000	1/4	30	--	--	--	--	--	--	--
	5/16	250	250	250	250	250	250	250	250
36000	5/16	225	250	250	250	250	250	250	250
42000	5/16	175	200	250	250	250	250	250	250

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Benefits of 1/4" and 5/16" Liquid lines

1. Lower install cost for replacement jobs; no need to change existing lineset
2. Lower refrigerant cost; less field supplied refrigerant needed for longer linesets
3. Lower cost for new lineset
4. Less system charge = better reliability

Example comparing 50ft lineset with 5/8 suction line

	Liquid Line Diameter	Refrigerant Required	Refrigerant cost saving*	Approximate lineset cost saving**	Total approximate cost savings
50 ft lineset	3/8	21oz	-	-	-
5/8 suction	1/4	4.5oz	\$9.32	\$13.94	\$23.26
line	5/16	11oz	\$5.62	\$6.34	\$11.96

Example comparing 50ft lineset with 3/4 suction line

	Liquid Line Diameter	Refrigerant Required	Refrigerant cost saving*	Approximate lineset cost saving**	Total approximate cost savings
50 ft lineset	3/8	21oz	-	-	-
3/4 suction	1/4	4.5oz	\$9.32	\$25.00	\$34.32
line	5/16	11oz	\$5.62	\$12.72	\$18.34

* Refrigerant cost saving based on R-410A refrigerant at a hypothetical cost of \$9.00 per lb

** Approximate costs based on February 2008 lineset cost to dealer as quoted by an independent distributor

[If you have any questions or comments, please contact the Marketing Services Department at \(931\) 270-4306.](#)

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