



# Suction, Discharge, and Liquid Line Capacities in Tons for Opteon™ XL41 Refrigerant R-454B (Single- or High-Stage Applications)

Line Size	Suction Lines, $\Delta t = 2^\circ\text{F}$						Discharge Lines, $\Delta t = 1^\circ\text{F}, \Delta p = 4.52 \text{ psi}$						Liquid Lines			
	Saturated Suction Temperature, $^\circ\text{F}$						Saturated Suction Temperature, $^\circ\text{F}$						$\Delta t = 1^\circ\text{F}$			
	-60	-40	-20	0	20	40	-60	-40	-20	0	20	40	Velocity = 100 fpm	Drop/ 100 ft $\Delta p = 4.49$	Drop/ 100 ft $\Delta p = 22.0$	
Type L Copper, OD	Corresponding $\Delta p$ , psi/ 100 ft						Corresponding $\Delta p$ , psi/ 100 ft									
	0.76	1.16	1.69	2.36	3.19	4.19	4.52	4.52	4.52	4.52	4.52	4.52				
1/2	0.10	0.17	0.28	0.43	0.64	0.92	1.06	1.15	1.24	1.33	1.41	1.49	2.31	5.26	12.45	
5/8	0.19	0.33	0.53	0.82	1.21	1.73	2.00	2.16	2.32	2.49	2.64	2.80	3.71	9.89	23.29	
3/4	0.32	0.56	0.90	1.39	2.06	2.94	3.40	3.67	3.94	4.23	4.49	4.75	5.55	16.84	39.51	
7/8	0.50	0.87	1.40	2.15	3.18	4.54	5.25	5.66	6.11	6.52	6.93	7.33	7.71	26.03	60.82	
1 1/8	1.03	1.76	2.84	4.36	6.44	9.17	10.61	11.44	12.34	13.17	13.99	14.79	13.14	52.68	122.63	
1 3/8	1.80	3.08	4.96	7.61	11.21	15.95	18.45	19.90	21.45	22.89	24.32	25.71	20.01	91.76	212.95	
1 5/8	2.86	4.89	7.86	12.04	17.72	25.18	29.13	31.40	33.85	36.12	38.36	40.55	28.33	144.98	335.65	
2 1/8	5.97	10.15	16.30	24.95	36.67	51.99	60.21	64.90	69.93	74.61	79.22	83.72	49.28	300.09	691.80	
2 5/8	10.59	17.98	28.84	44.09	64.63	91.66	106.15	114.39	123.23	131.45	139.55	147.47	76.00	529.60	1217.94	
3 1/8	16.95	28.74	46.05	70.32	103.08	145.96	169.02	182.11	196.15	208.96	221.81	235.53	108.47	843.93	1934.82	
3 5/8	25.25	42.77	68.46	104.45	153.00	216.53	251.45	271.13	290.57	309.86	328.88	347.44	146.71	1252.68	2867.66	
4 1/8	35.64	60.38	96.58	147.24	215.55	304.89	354.09	381.74	409.05	436.17	462.88	488.99	190.72	1763.60	4034.93	
5 1/8	63.91	108.12	172.72	262.69	384.18	543.26	631.89	680.47	729.03	777.24	824.76	871.16	297.24	3147.68	7185.48	
6 1/8	102.98	174.00	277.67	421.97	616.61	871.46	1013.43	1091.21	1168.92	1246.06	1322.07	1396.31	427.29	5048.57	11512.94	
8 1/8	214.29	361.07	575.34	873.23	1273.49	1799.84	2092.33	2252.31	2412.15	2570.90	2727.30	2880.01	746.36	10439.27	23734.89	
Steel																
IPS	SCH															
3/8	80	0.08	0.14	0.22	0.33	0.48	0.67	0.78	0.84	0.90	0.96	1.01	1.07	2.24	3.93	8.78
1/2	80	0.16	0.27	0.43	0.65	0.94	1.32	1.54	1.65	1.77	1.88	1.99	2.10	3.73	7.72	17.28
3/4	80	0.37	0.62	0.98	1.47	2.13	2.98	3.46	3.72	3.98	4.23	4.49	4.73	6.89	17.42	38.72
1	80	0.73	1.22	1.91	2.88	4.17	5.84	6.77	7.28	7.79	8.29	8.79	9.27	11.45	34.15	75.80
1 1/4	80	1.93	3.20	5.03	7.56	10.89	15.25	17.77	19.10	20.43	21.75	23.01	24.27	23.82	89.23	198.48
1 1/2	80	2.89	4.81	7.56	11.35	16.39	22.87	26.66	28.60	30.60	32.58	34.51	36.41	32.42	133.88	297.70
2	40	5.60	9.29	14.59	21.89	31.61	44.09	51.33	55.16	58.99	62.80	66.55	70.20	53.44	259.06	573.97
2 1/2	40	8.94	14.84	23.28	34.73	50.40	70.53	81.82	87.92	94.04	100.09	106.06	111.89	76.24	413.13	913.52
3	40	15.84	26.21	41.11	61.39	86.63	124.02	144.55	155.34	166.13	177.43	187.14	197.45	117.72	726.50	1614.29
4	40	32.33	53.46	83.78	125.49	180.51	252.54	294.03	315.87	337.97	359.72	381.16	402.07	202.72	1479.78	3282.38
5	40	58.48	96.63	151.34	226.63	327.04	455.91	530.92	570.50	610.05	649.31	687.97	725.71	318.58	2681.29	5924.81
6	40	94.60	156.27	244.63	366.24	528.52	739.20	857.71	921.64	984.42	1048.15	1110.56	1171.45	460.06	4311.80	9571.66
8	40	193.91	318.52	498.30	745.93	1076.20	1505.47	1752.70	1882.96	2013.51	2143.00	2270.62	2397.79	796.65	8826.27	19589.94
10	40	351.19	578.63	901.67	1349.52	1946.91	2723.29	3172.48	3407.96	3643.42	3877.20	4107.54	4332.31	1255.71	15964.13	35443.49
12	ID <sup>a</sup>	561.27	925.66	1447.33	2158.02	3113.04	4370.09	5074.66	5451.57	5827.89	6201.79	6570.18	6929.69	1801.01	25624.79	56657.29
14	30	726.66	1198.13	1873.21	2802.88	4024.00	5628.88	6562.87	7049.93	7536.94	8020.47	8496.88	8961.79	2195.76	32997.17	73206.81
16	30	1047.99	1727.39	2700.36	4040.93	5800.21	8113.37	9451.27	10152.54	10853.28	11549.02	12234.52	12903.50	2908.65	47585.97	105524.59

<sup>a</sup> Pipe inside diameter is same as nominal pipe size.

<sup>1</sup> Tons based on standard refrigerant cycle of 105 °F saturated liquid and saturated evaporator outlet temperature. Liquid tons based on 20 °F evaporator temperature.

<sup>2</sup> Suction line pressure drop assuming half of the pressure drop occurs upstream of the reference temperature.

<sup>3</sup> Discharge line pressure drop calculations assume saturated vapor temperature drop.

<sup>4</sup> Discharge pressure drop inlet conditions calculated assuming isentropic compressor efficiency of 0.7 and pressure corresponding to condenser saturated liquid outlet temperature.

<sup>5</sup> Liquid line pressure drop assuming reference temperature at inlet with temperature drop occurring downstream.

<sup>6</sup> Thermophysical properties and viscosity data based on calculations from NIST REFPROP program Version 10.

<sup>7</sup> Capacities based on conditions outside of these tables can be provided upon request.

<sup>8</sup> Cells highlighted in gray indicate the calculated velocity from the given saturated temperature drop is outside of the recommended gas line velocities per ASHRAE Refrigeration Handbook.

The line sizes are theoretical estimates based on best practices following industry guidelines.

