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Capillary tube selection table.

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Capillary tube selection table.

Capillary tube is a simple, inexpensive expansion device widely used in refrigerating and air conditioning systems of small and medium size. It consists in a long tube of small diameter (length is of 1000 to 5000 times the internal diameter) that reduces refrigerant pressure by the friction of the refrigerant flow with the tube walls. Nevertheless, its diameter is too big to allow physical capillary effect having any meaning.

While its working principle is of easy understanding, its simulation requires complex calculations and several assumptions that make the result to be far from mathematical accuracy. In the industrial practice, cooling system designers use empirical knowledge for defining the capillary tube. That empirical knowledge is reinforced by the use of tables that compressor manufacturers usually provide. *Whichever be the criteria for selecting a capillary tube, diameter and length, its suitability for the optimum performances of the refrigerating system must be confirmed throughout laboratory tests.*

Tables for capillary tube selection are included in this document. A different table is presented for each refrigerant and for each working condition (Low Back pressure –LBP- or High-Medium Back Pressure –HMBP-). They have been calculated through a computer simulation based on physical principles including assumptions that makes the model of easy use, and specific refrigerant characteristics. The validity of the simplifications, for traditional refrigerants (R12), has been proved by cross-checking the outputs of the model with many published capillary tables and testing experience. Among the assumptions: *those that proved to be acceptable for traditional refrigerants are also acceptable for the new ones*.

Use of the tables

The characteristic of the capillary tube is defined by the refrigerant mass flow rate as a function of inlet and outlet pressures and other relevant working conditions. But the most common problem is to define the *diameter and length of the capillary tube knowing the compressor used in the system and approximate evaporating / condensing temperatures.* This can be easily done with the use of attached tables.

The attached tables are calculated for evaporating temperatures of –30 and –23.3 ºC (LBP) or –5 and +7.2 ºC (HMBP) with condensing temperature of 45 ºC. It can be observed that evaporating temperature does not much affect the capillary length. The influence of a different condensing temperature is explained below.

Compressor cooling capacity at the working evaporating / condensing temperatures can be gathered from Compressor Technical Data Sheet or catalogues. Capillary tables are prepared for cooling capacities in kcal/h under ASHRAE testing conditions (subcooled down to 32 ºC for LBP or 9 K for HMBP, return gas at 32 ºC for LBP and 35 ºC for HMBP).

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Capillary tube selection table.

Enter the corresponding table (depends on refrigerant and use, LBP or HMBP) with that value through the leftist column (Q_{ASH}).

In the same raw where finding the cooling capacity value it can be obtained the length of the suitable capillary tube in the crossing cell with the column of corresponding internal capillary diameter and evaporating temperature.

If condensing temperature is different from 45 ºC, capillary tube length must be increased by around 2-3 % for each K (each ºC) of increase in condensing temperature.

Example 1.- An ML90FB compressor (R404A, LBP model) will be used in a given cooling system design that will usually work with evaporating / condensing temperatures of –30 / 45 ºC. Under these conditions, catalogue data indicates a cooling capacity of 296 kcal/h (ASHRAE).

R404A, LBP table must be consulted looking for the closest value to 296 kcal/h. It appears 300 kcal/h (close enough) in the 10th raw of the first column (Q_{ASH}). Going to the right in the same raw we find in columns 7 and 9 two possible options:

ID (mm) x L (mm) = a) *0.8 x 1220* b) *0.9 x 2300*

Example 2.- GS26TB (R134a, HMBP model) working at –5 / 50 ºC gives a cooling capacity of 1376 kcal/h (ASHRAE).The corresponding table shows the value of 1300 in the first column, 35th raw column. On the right columns it is found a capillary tube of ID (mm) x L (m) = a) 1.5 x 1370 b) 1.7 x 2790 mm. But length are referred to 45 ºC condensing temperature and actual value is 50 ºC. So, we have to increase the length 2 % per eack K of difference: 2 %·(50 – 45) = 10 %. Finally the length of possible capillaries will be:

a) 1.5 x (1370 + 10 %·1370) = *1.5 x 1500* b) 1.7 x (2790 + 10%·2790) = *1.7 x 3070*

Application Engineering
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CAPILLARY TUBE SELECTION

R 134a (HMBP)

Table considers condensing temperature T_c = 45 °C. Non adiabatic flow in capillary.
Increase length in 2% per each K of increase in condensing temperature.

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)															
		0.7		0.8		0.9		1		1.2		1.5		1.7		2	
kcal/h	kg/h.	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2
100	2.32	4.11	3.86														
110	2.56	3.40	3.20														
120	2.79	2.88	2.71														
130	3.02	2.45	2.31														
140	3.25	2.12	2.00	4.30	4.04												
150	3.49	1.84	1.74	3.77	3.55												
160	3.72	1.62	1.53	3.32	3.12												
170	3.95	1.43	1.35	2.93	2.76												
180	4.18	1.27	1.21	2.63	2.48												
190	4.42	1.14	1.08	2.36	2.23	4.43	4.16										
200	4.65			2.13	2.00	3.99	3.76										
220	5.11			1.75	1.65	3.31	3.12										
240	5.58			1.47	1.40	2.78	2.63	4.88	4.59								
260	6.04			1.24	1.18	2.36	2.23	4.15	3.91								
280	6.51			1.06	1.02	2.04	1.93	3.60	3.40								
300	6.97					1.77	1.68	3.13	2.96								
320	7.44					1.55	1.47	2.75	2.60								
340	7.90					1.36	1.30	2.42	2.29								
360	8.37					1.21	1.15	2.17	2.06								
380	8.83					1.08	1.03	1.94	1.84	5.19	4.89						
400	9.30							1.74	1.66	4.67	4.42						
450	10.46							1.36	1.30	3.69	3.48						
500	11.62							1.09	1.05	2.99	2.83						
550	12.78									2.46	2.33						
600	13.95									2.05	1.95						
650	15.11									1.73	1.65	5.83	5.50				
700	16.27									1.47	1.42	5.00	4.73				
750	17.43									1.28	1.23	4.38	4.15				
800	18.60									1.11	1.08	3.84	3.64				
850	19.76											3.39	3.22				
900	20.92											3.00	2.86				
1000	23.25											2.40	2.30	4.80	4.54		
1100	25.57											1.98	1.90	3.94	3.74		
1200	27.89											1.64	1.58	3.28	3.12		
1300	30.22											1.37	1.33	2.79	2.66		
1400	32.54											1.16	1.13	2.38	2.29		
1500	34.87													2.05	1.98	5.01	4.76
1600	37.19													1.78	1.72	4.42	4.21
1700	39.52													1.55	1.51	3.90	3.72
1800	41.84													1.36	1.33	3.45	3.31
1900	44.17													1.20	1.18	3.08	2.95
2000	46.49													1.06	1.05	2.75	2.65
2250	52.30															2.12	2.06
2500	58.11															1.66	1.63
2750	63.92															1.35	1.33
3000	69.74															1.09	1.10

Q_{ASH} is the cooling capacity under ASHRAE (HMBP) condition corresponding to the indicated mass flow rate M
(liquid subcooled 9K, return gas superheated up to 35 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

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CAPILLARY TUBE SELECTION

R 404A (HMBP)

Table considers condensing temperature T_c = 45 ºC. Non adiabatic flow in capillary.
Increase length in 2% per each K of increase in condensing temperature.

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC															
		0.7		0.8		0.9		1		1.2		1.5		1.7		2	
kcal/h	kg/h.	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2
110	3.12	4.75	4.30														
120	3.41	4.00	3.61														
130	3.69	3.42	3.10														
140	3.97	2.95	2.67														
150	4.26	2.57	2.33														
160	4.54	2.25	2.05	4.62	4.19												
170	4.83	2.00	1.81	4.10	3.72												
180	5.11	1.77	1.61	3.66	3.32												
190	5.39	1.60	1.45	3.28	2.98												
200	5.68	1.44	1.31	2.96	2.69												
220	6.24	1.19	1.08	2.44	2.22	4.61	4.18										
240	6.81			2.04	1.87	3.86	3.52										
260	7.38			1.75	1.60	3.30	2.99										
280	7.95			1.50	1.37	2.84	2.58										
300	8.52			1.30	1.19	2.46	2.24	4.37	3.96								
320	9.08			1.14	1.05	2.17	1.97	3.83	3.48								
340	9.65					1.92	1.75	3.39	3.08								
360	10.22					1.71	1.56	3.02	2.74								
380	10.79					1.53	1.40	2.70	2.46								
400	11.35					1.38	1.26	2.43	2.22								
450	12.77							1.93	1.76								
500	14.19							1.55	1.42	4.16	3.78						
550	15.61							1.27	1.17	3.43	3.11						
600	17.03									2.86	2.61						
650	18.45									2.44	2.23						
700	19.87									2.10	1.92						
750	21.29									1.82	1.67						
800	22.71									1.59	1.47						
850	24.13									1.40	1.29	4.72	4.29				
900	25.55									1.24	1.15	4.20	3.82				
1000	28.38											3.40	3.11				
1100	31.22											2.80	2.57				
1200	34.06											2.34	2.15	4.63	4.22		
1300	36.90											1.98	1.82	3.93	3.59		
1400	39.74											1.69	1.56	3.38	3.09		
1500	42.58											1.46	1.35	2.93	2.69		
1600	45.42											1.27	1.18	2.56	2.35		
1700	48.25											1.11	1.03	2.25	2.07		
1800	51.09													1.99	1.84	4.87	4.45
1900	53.93													1.77	1.64	4.36	3.99
2000	56.77													1.58	1.47	3.92	3.59
2250	63.87													1.22	1.14	3.06	2.81
2500	70.96															2.44	2.25
2750	78.06															1.99	1.84
3000	85.15															1.64	1.53
3250	92.25															1.37	1.29
3500	99.35															1.16	1.10

Q_{ASH} is the cooling capacity under ASHRAE (HMBP) condition corresponding to the indicated mass flow rate M
(liquid subcooled 9K, return gas superheated up to 35 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

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CAPILLARY TUBE SELECTION

R 290 (HMBP)

Table considers condensing temperature t_c = 45 ºC. Non adiabatic flow in capillary.
Increase length in 2% per each K of increase in condensing temperature.

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)													
		0.7		0.8		0.9		1		1.2		1.5		1.7	
kcal/h	kg/h.	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2
130	1.58	5.12	4.39												
140	1.70	4.43	4.06												
150	1.83	3.88	3.55												
160	1.95	0.41	3.12												
170	2.07	3.01	2.77												
180	2.19	2.70	2.48	5.50	5.04										
190	2.31	2.43	2.23	4.95	4.54										
200	2.43	2.19	2.01	4.47	4.10										
220	2.68	1.80	1.66	3.69	3.40										
240	2.92	1.51	1.40	3.12	2.86	5.84	5.35								
260	3.16	1.29	1.19	2.66	2.44	4.97	4.56								
280	3.41	1.11	1.03	2.28	2.10	4.30	3.95								
300	3.65			1.98	1.83	3.76	3.45								
320	3.89			1.75	1.62	3.30	3.04								
340	4.14			1.55	1.43	2.92	2.69	5.11	4.71						
360	4.38			1.38	1.27	2.60	2.39	4.60	4.22						
380	4.62			1.23	1.14	2.33	2.15	4.13	3.79						
400	4.87			1.10	1.02	2.11	1.95	3.72	3.42						
450	5.48					1.66	1.54	2.93	2.69						
500	6.08					1.33	1.24	2.38	2.19						
550	6.69					1.09	1.01	1.96	1.81	5.23	4.80				
600	7.30							1.63	1.51	4.38	4.03				
650	7.91							1.38	1.28	3.72	3.42				
700	8.52							1.18	1.10	3.21	2.96				
750	9.13									2.80	2.59				
800	9.73									2.46	2.27				
850	10.34									2.17	2.00				
900	10.95									1.92	1.78				
950	11.56									1.71	1.59				
1000	12.17									1.54	1.43	5.17	4.76		
1050	12.78									1.38	1.29	4.70	4.34		
1100	13.38									1.25	1.17	4.30	3.96		
1150	13.99									1.14	1.07	3.93	3.63		
1200	14.60											3.60	3.33		
1250	15.21											3.31	3.06		
1300	15.82											3.05	2.83		
1350	16.43											2.82	2.61		
1400	17.03											2.61	2.42	5.18	4.77
1450	17.64											2.43	2.25	4.82	4.45
1500	18.25											2.26	2.10	4.50	4.15
1550	18.86											2.11	1.96	4.20	3.88
1600	19.47											1.97	1.84	3.94	3.64
1650	20.08											1.84	1.72	3.69	3.42
1700	20.68											1.73	1.62	3.47	3.21

Q_{ASH} is the cooling capacity underASHRAE (HMBP) condition corresponding to the indicated mass flow rate M
(liquid subcooled 9K, return gas superheated up to 35 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

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CAPILLARY TUBE SELECTION

R 12 (HMBP)

Table considers condensing temperature Tc = 45 ºC. Non adiabatic flow in capillary.
Increase length in 2% per each K of increase in condensing temperature.

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)													
		0.7		0.8		0.9		1		1.2		1.5		1.7	
kcal/h	kg/h.	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2
70	2.09	4.61	4.87												
75	2.24	4.05	4.26												
80	2.38	3.57	3.77												
85	2.53	3.18	3.35												
90	2.68	2.84	2.99												
95	2.83	2.56	2.70												
100	2.98	2.31	2.44	4.68	4.93										
110	3.28	1.90	2.02	3.89	4.09										
120	3.58	1.61	1.70	3.29	3.47										
130	3.87	1.36	1.45	2.80	2.96										
140	4.17	1.18	1.25	2.43	2.57	4.51	4.75								
150	4.47			2.11	2.24	3.96	4.18								
160	4.77			1.85	1.96	3.48	3.67								
170	5.07			1.64	1.74	3.09	3.27								
180	5.37			1.47	1.56	2.77	2.92	4.84							
190	5.66			1.31	1.39	2.48	2.62	4.34	4.58						
200	5.96			1.18	1.25	2.23	2.36	3.91	4.12						
225	6.71					1.77	1.88	3.11	3.29						
250	7.45					1.42	1.51	2.51	2.65						
275	8.20					1.17	1.25	2.08	2.21						
300	8.94							1.74	1.85	4.65	4.91				
325	9.69							1.47	1.56	3.95	4.18				
350	10.43							1.27	1.36	3.39	3.59				
375	11.18							1.09	1.17	2.98	3.16				
400	11.92									2.61	2.77				
425	12.67									2.30	2.44				
450	13.41									2.04	2.17				
475	14.16									1.83	1.96				
500	14.90									1.65	1.77				
550	16.39									1.34	1.45	4.57	4.84		
600	17.88									1.11	1.20	3.82	4.05		
650	19.37											3.23	3.44		
700	20.86											2.79	2.98		
750	22.35											2.43	2.59	4.76	5.05
800	23.85											2.11	2.26	4.16	4.42
850	25.34											1.85	1.99	3.70	3.94
900	26.83											1.64	1.76	3.30	3.52
950	28.32											1.45	1.57	2.95	3.15
1000	29.81											1.29	1.41	2.64	2.83

Q_{ASH} is the cooling capacity underASHRAE (HMBP) condition corresponding to the indicated mass flow rate M
(liquid subcooled 9K, return gas superheated up to 35 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

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CAPILLARY TUBE SELECTION

R 22 (HMBP)

Table considers condensing temperature T_c = 45 ºC. Non adiabatic flow in capillary.
Increase length in 2% per each K of increase in condensing temperature.

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)											
		0.7		0.8		0.9		1		1.2		1.5	
kcal/h	kg/h.	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2	-5	7.2
100	2.23												
120	2.67	4.54	4.68										
130	2.90	3.90	4.02										
140	3.12	3.36	3.47										
150	3.34	2.92	3.03										
160	3.57	2.59	2.68										
170	3.79	2.29	2.37	4.67	4.82								
180	4.01	2.04	2.11	4.16	4.30								
190	4.24	1.83	1.89	3.73	3.88								
200	4.46	1.66	1.72	3.40	3.52								
215	4.79	1.43	1.49	2.94	3.04								
230	5.13	1.25	1.30	2.56	2.65	4.79	4.95						
245	5.46	1.09	1.14	2.26	2.35	4.26	4.41						
260	5.80		1.01	2.01	2.09	3.79	3.92						
275	6.13			1.80	1.87	3.38	3.50						
300	6.69			1.50	1.56	2.83	2.94	5.00					
320	7.13			1.31	1.37	2.50	2.60	4.40	4.55				
340	7.58			1.16	1.22	2.21	2.30	3.89	4.02				
360	8.02			1.04	1.09	1.97	2.05	3.46	3.58				
380	8.47					1.76	1.83	3.12	3.24				
400	8.92					1.58	1.65	2.82	2.93				
450	10.03					1.25	1.31	2.22	2.31				
500	11.15						1.05	1.78	1.86	4.76	4.93		
550	12.26							1.47	1.54	3.96	4.11		
600	13.37							1.23	1.29	3.32	3.45		
650	14.49							1.03	1.09	2.82	2.93		
700	15.60									2.41	2.52		
750	16.72									2.09	2.18		
800	17.83									1.84	1.93		
850	18.95									1.63	1.71		
900	20.06									1.44	1.52	4.87	
950	21.18									1.28	1.35	4.36	4.53
1000	22.29									1.15	1.21	3.92	4.07
1100	24.52											3.21	3.35
1200	26.75											2.71	2.84
1300	28.98											2.30	2.41
1400	31.21											1.96	2.06
1500	33.44											1.69	1.78
1600	35.67											1.46	1.55

QASH is the cooling capacity under ASHRAE (HMBP) condition corresponding to the indicated mass flow rate M (liquid subcooled 9K, return gas superheated up to 35 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

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CAPILLARY TUBE SELECTION

R 134a (LBP)

Table considers condensing temperature Tc = 45 ºC and heat exchanger in capillary
Increase length 2% per each K of increase of condensing temperature

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)													
		0.6		0.7		0.8		0.9		1		1.2		1.5	
kcal/h	kg/h	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23
75	1.69	2.81	2.96												
80	1.80	2.47	2.60												
85	1.91	2.18	2.31												
90	2.03	1.95	2.06												
95	2.14	1.75	1.85												
100	2.25	1.58	1.67												
105	2.36	1.43	1.52	3.30	3.48										
110	2.48	1.30	1.38	3.00	3.17										
115	2.59	1.19	1.26	2.74	2.90										
120	2.70	1.10	1.16	2.52	2.66										
125	2.82	1.01	1.07	2.32	2.45										
130	2.93			2.14	2.26										
140	3.15			1.85	1.95	3.82	4.04								
150	3.38			1.61	1.70	3.32	3.51								
160	3.60			1.41	1.49	2.91	3.08								
170	3.83			1.25	1.32	2.58	2.72								
180	4.05			1.11	1.17	2.29	2.42								
190	4.28					2.06	2.17	3.90	4.12						
200	4.50					1.85	1.95	3.52	3.71						
210	4.73					1.68	1.77	3.18	3.36						
220	4.95					1.53	1.61	2.90	3.06						
230	5.18					1.39	1.47	2.65	2.79						
240	5.41					1.28	1.35	2.43	2.56	4.29	4.56				
250	5.63						1.24	2.23	2.36	3.94	4.19				
275	6.19							1.84	1.94	3.25	3.45				
300	6.76							1.54	1.63	2.72	2.89				
325	7.32								1.38	2.31	2.45				
350	7.88								1.19	1.98	2.10				
375	8.45								1.03	1.72	1.83				
400	9.01										1.60	4.11	4.34		
425	9.57										1.41	3.63	3.83		
450	10.14										1.26	3.22	3.40		
475	10.70										1.13	2.88	3.04		
500	11.26										1.01	2.59	2.73		
525	11.82											2.34	2.47		
550	12.39											2.13	2.24		
575	12.95											1.94	2.05		
600	13.51											1.78	1.87		
650	14.64												1.59		
700	15.77												1.36	4.38	4.61
750	16.89												1.18	3.79	4.00
800	18.02												1.03	3.30	3.49
850	19.14													2.91	3.07
900	20.27													2.58	2.72
950	21.40													2.30	2.42
1000	22.52													2.06	2.18

QASH is the cooling capacity under ASHRAE (LBP) condition corresponding to the indicated mass flow rate M (liquid subcooled down to 32 ºC, return gas superheated up to 32 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

Electrolux
COMPRESSORS

CAPILLARY TUBE SELECTION

R 600a (LBP)

Table considers condensing temperature T_c = 45 ºC and heat exchanger in capillary

Increase length 2% per each K of increase of condensing temperature

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)									
		0.6		0.7		0.8		0.9		1	
kcal/h	kg/h	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3
55	0.69	3.13	3.28								
60	0.75	2.64	2.77								
65	0.81	2.26	2.36								
70	0.87	1.95	2.05								
75	0.93	1.71	1.79								
80	1.00	1.51	1.58								
85	1.06	1.34	1.40	3.03	3.18						
90	1.12	1.20	1.25	2.71	2.84						
95	1.18	1.08	1.13	2.43	2.55						
100	1.25			2.20	2.31						
105	1.31			2.00	2.09						
110	1.37			1.82	1.91						
115	1.43			1.67	1.75						
120	1.49			1.54	1.61	3.14	3.28				
130	1.62			1.31	1.37	2.67	2.80				
140	1.74				1.19	2.31	2.42				
150	1.87					2.01	2.11				
160	1.99					1.77	1.85	3.33	3.49		
170	2.12					1.57	1.64	2.95	3.10		
180	2.24					1.40	1.47	2.64	2.77		
190	2.37					1.26	1.32	2.37	2.49		
200	2.49					1.14	1.19	2.14	2.25		
210	2.62					1.03	1.08	1.95	2.04	3.39	3.56
220	2.74							1.77	1.86	3.09	3.25
230	2.87							1.63	1.71	2.82	2.97
240	2.99							1.49	1.57	2.59	2.73
250	3.11							1.38	1.45	2.39	2.51

Q_{ASH} is the cooling capacity under ASHRAE (LBP) condition corresponding to the indicated mass flow rate M (liquid subcooled down to 32ºC, return gas superheated up to 32 ºC)

The relationship between length and diameter is. Approximately : $(L / L_0) = (D / D_0)^{5,4}$

Electrolux
COMPRESSORS

CAPILLARY TUBE SELECTION

R 404A (LBP)

Table considers condensing temperature T_c = 45 ºC and heat exchanger in capillary
Increase length 2% per each K of increase of condensing temperature

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC													
		0,6		0.7		0.8		0.9		1		1.2		1.5	
kcal/h	kg/h	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3
130	3.51	1.39	1.47	3.22	3.38										
135	3.64	1.29	1.36	2.99	3.13										
140	3.78	1.20	1.26	2.77	2.91										
145	3.91	1.11	1.18	2.58	2.71										
150	4.05	1.04	1.10	2.41	2.52										
155	4.18		1.03	2.25	2.36										
160	4.32			2.11	2.21										
165	4.45			1.98	2.08										
170	4.59			1.87	1.96										
175	4.72			1.76	1.84	3.68	3.81								
180	4.86			1.66	1.74	3.48	3.60								
190	5.13			1.49	1.56	3.11	3.22								
200	5.40			1.34	1.40	2.80	2.90								
225	6.07			1.05	1.10	2.20	2.28								
250	6.74					1.77	1.83	3.35	3.49						
275	7.42					1.46	1.51	2.75	2.87						
300	8.09					1.22	1.26	2.30	2.40						
325	8.77					1.04	1.07	1.94	2.03	3.55	3.69				
350	9.44							1.67	1.74	3.04	3.17				
375	10.12							1.45	1.51	2.64	2.74				
400	10.79							1.27	1.32	2.30	2.40				
425	11.46							1.12	1.17	2.03	2.11				
450	12.14								1.04	1.80	1.88				
475	12.81									1.61	1.68				
500	13.49									1.45	1.51				
525	14.16									1.31	1.36	3.54	3.78		
550	14.84									1.19	1.24	3.21	3.43		
575	15.51									1.08	1.13	2.92	3.12		
600	16.19										1.03	2.67	2.85		
650	17.53											2.25	2.41		
700	18.88											1.93	2.06		
750	20.23											1.67	1.79		
800	21.58											1.45	1.56		
850	22.93											1.28	1.37		
900	24.28											1.13	1.22		
950	25.63											1.01	1.09	3.54	3.76
1000	26.98													3.18	3.38
1100	29.67													2.61	2.77
1200	32.37													2.18	2.32
1300	35.07													1.84	1.96
1400	37.77													1.58	1.68
1500	40.46													1.37	1.46

Q_{ASH} is the cooling capacity under ASHRAE (LBP) condition corresponding to the indicated mass flow rate M (liquid subcooled down to 32 ºC, return gas superheated up to 32 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

Electrolux
COMPRESSORS

CAPILLARY TUBE SELECTION

R 290 (LBP)

Table considers condensing temperature t_c = 45 ºC and heat exchanger in capillary
Increase length 2% per each K of increase of condensing temperature

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC													
		0.6		0.7		0.8		0.9		1		1.2		1.5	
kcal/h	kg/h	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3
150	1.76	1.55	1.62	3.59	3.76										
155	1.82	1.45	1.51	3.36	3.52										
165	1.94	1.28	1.33	2.96	3.10										
175	2.05	1.14	1.18	2.63	2.75										
185	2.17	1.02	1.06	2.35	2.46										
200	2.35			2.01	2.10										
210	2.47			1.82	1.91	3.77	3.94								
220	2.58			1.65	1.73	3.43	3.58								
235	2.76			1.45	1.52	3.00	3.13								
250	2.93			1.28	1.34	2.64	2.76								
265	3.11			1.14	1.19	2.34	2.45								
280	3.29			1.02	1.07	2.10	2.19								
295	3.46					1.88	1.97	3.60	3.76						
315	3.70					1.65	1.72	3.14	3.29						
335	3.93					1.45	1.52	2.76	2.90						
355	4.17					1.29	1.35	2.45	2.58						
375	4.40					1.15	1.21	2.19	2.30						
395	4.64					1.04	1.09	1.97	2.07	3.56	3.70				
420	4.93							1.73	1.82	3.13	3.26				
445	5.22							1.54	1.62	2.78	2.89				
470	5.52							1.37	1.45	2.48	2.58				
500	5.87							1.21	1.28	2.18	2.27				
530	6.22							1.07	1.13	1.93	2.01				
560	6.57									1.72	1.80				
595	6.98									1.52	1.58				
630	7.40									1.35	1.41	3.66	3.82		
670	7.87									1.19	1.24	3.21	3.36		
705	8.28									1.07	1.11	2.88	3.02		
750	8.80											2.53	2.65		
795	9.33											2.24	2.34		
840	9.86											1.99	2.08		
890	10.45											1.76	1.84		
945	11.09											1.55	1.63		
1000	11.74											1.38	1.44		
1060	12.44											1.22	1.28		
1120	13.15											1.09	1.14	3.77	3.89
1190	13.97													3.34	3.45
1260	14.79													2.98	3.08
1335	15.67													2.65	2.74
1415	16.61													2.36	2.44
1500	17.61													2.10	2.17

Q_{ASH} is the cooling capacity underASHRAE (LBP) condition corresponding to the indicated mass flow rate M
(liquid subcooled down to 32ºC, return gas superheated up to 32 ºC)
The relationship between length and diameter is. Approximately : $(L / L_0) = (D / D_0)^{5,4}$

Electrolux
COMPRESSORS

CAPILLARY TUBE SELECTION
R 12 (LBP)

Table considers condensing temperature T_C = 45 ºC and heat exchanger in capillary
Increase length 2% per each K of increase of condensing temperature

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)													
		0.6		0.7		0.8		0.9		1		1.2		1.5	
kcal/h	kg/h	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3
55	1.6	2.98	3.12												
60	1.7	2.50	2.62												
65	1.9	2.13	2.23												
70	2.0	1.83	1.92												
75	2.2	1.59	1.67												
80	2.3	1.40	1.46	3.20	3.35										
85	2.5	1.24	1.30	2.84	2.97										
90	2.6	1.10	1.15	2.53	2.65										
95	2.8	0.99	1.04	2.27	2.38										
100	2.9			2.05	2.14										
110	3.2			1.70	1.77	3.49	3.65								
120	3.5			1.43	1.49	2.93	3.07								
130	3.8			1.22	1.27	2.49	2.61								
140	4.1			1.05	1.10	2.14	2.25	4.13	4.27						
150	4.3					1.87	1.96	3.58	3.71						
160	4.6					1.64	1.72	3.13	3.25						
170	4.9					1.45	1.53	2.76	2.87						
180	5.2					1.29	1.36	2.45	2.56	4.36	4.57				
190	5.5					1.16	1.22	2.19	2.29	3.90	4.09				
200	5.8					1.04	1.10	1.97	2.06	3.51	3.68				
225	6.5							1.54	1.62	2.75	2.88				
250	7.2							1.24	1.31	2.21	2.32				
275	8.0							1.02	1.08	1.82	1.91	4.97	5.22		
300	8.7									1.52	1.59	4.15	4.35		
325	9.4									1.29	1.35	3.51	3.68		
350	10.1									1.11	1.16	3.01	3.15		
375	10.9											2.61	2.73		
400	11.6											2.28	2.39		
450	13.0											1.78	1.87		
500	14.5											1.43	1.50	4.93	5.20
550	15.9											1.17	1.23	4.03	4.26
600	17.4													3.36	3.55
650	18.8													2.84	3.00
700	20.3													2.43	2.57
750	21.7													2.11	2.22
800	23.2													1.84	1.94
850	24.6													1.62	1.71

Q_{ASH} is the cooling capacity under ASHRAE (LBP) condition corresponding to the indicated mass flow rate M (liquid subcooled down to 32 ºC, return gas superheated up to 32 ºC)

The relationship between length and diameter is, approximately : $(L / L_o) = (D / D_o)^{5,4}$

Electrolux
COMPRESSORS

CAPILLARY TUBE SELECTION

R 22 (LBP)

Table considers condensing temperature ϑ_c = 45 ºC and heat exchanger in capillary
Increase length 2% per each K of increase of condensing temperature

Capillary tube length (m)

Q_{ASH}	M	Capillary tube internal diameter (mm) & Evaporating temperature (ºC)													
		0.6		0.7		0.8		0.9		1		1.2		1.5	
kcal/h	kg/h	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3	-30	-23.3
100	2.16	2.63	2.76												
120	2.59	1.81	1.90												
130	2.80	1.54	1.62												
140	3.02	1.33	1.39	3.06	3.20										
150	3.23	1.15	1.21	2.66	2.79										
160	3.45	1.01	1.06	2.33	2.45										
170	3.66			2.07	2.17										
180	3.88			1.84	1.93										
190	4.10			1.65	1.73	3.42	3.58								
200	4.31			1.49	1.56	3.08	3.23								
215	4.64			1.29	1.35	2.65	2.78								
230	4.96			1.12	1.18	2.31	2.42								
245	5.28			0.99	1.04	2.03	2.13								
260	5.61					1.80	1.89	3.42	3.59						
275	5.93					1.60	1.68	3.05	3.20						
300	6.47					1.34	1.41	2.55	2.68						
320	6.90					1.17	1.23	2.23	2.35						
340	7.33					1.04	1.09	1.97	2.07	3.53	3.70				
360	7.76							1.75	1.84	3.13	3.29				
380	8.19							1.57	1.65	2.80	2.94				
400	8.62							1.41	1.48	2.52	2.64				
450	9.70							1.11	1.17	1.97	2.07				
500	10.78									1.58	1.66				
550	11.86									1.30	1.36	3.56	3.74		
600	12.94									1.08	1.14	2.96	3.11		
650	14.01									0.92	0.96	2.50	2.63		
700	15.09											2.14	2.25		
750	16.17											1.85	1.95		
800	17.25											1.62	1.70		
850	18.32											1.42	1.50		
900	19.40											1.26	1.33		
950	20.48											1.13	1.18		
1000	21.56											1.01	1.06	3.58	3.68
1100	23.71													2.97	3.01
1200	25.87													2.51	2.50
1300	28.03													2.14	2.11
1400	30.18													1.85	1.80
1500	32.34													1.62	1.56
1600	34.49													1.43	1.36

Q_{ASH} is the cooling capacity underASHRAE (LBP) condition corresponding to the indicated mass flow rate M
(liquid subcooled down to 32ºC, return gas superheated up to 32 ºC)

The relationship between length and diameter is, approximately : $(L / L_0) = (D / D_0)^{5,4}$

NOTE: *R22 is not recommended for LBP use.*