

Pipe dimensioning of copper pipes for refrigerants R 134a, R 404A, R 507, R 407C, R 410A

Basis for calculation

When selecting the cross-section of the pipe one must consider the maximum pressure drop and the maximum and/or minimum flow velocity (w) in the suction line for oil return.

For these tables the following guidelines and limit values apply:

Flow velocities

Pressure line	$w = 3,0 - 12,0$ m/s
Liquid line	$w = 0,4 - 1,0$ m/s
Suction line	$w = 4,0 - 15,0$ m/s

Pressure drop

Pressure and suction line 1 - 2 K

Depending on the evaporation temperature t_0 and the refrigerant, this corresponds to 0.1 - 0.5 bar.

Condensation line

The maximum flow velocity should be $w = 0.5$ m/s.

For greater refrigerating capacities this would entail unreasonably large pipe cross-sections.

For this reason in some cases velocities of up to $w = 1.5$ m/s have been approved in order to keep the pipe dimension within reasonable bounds.

Pipe dimensioning R 134 a

The indicated values are **reference values**.

For widely branched pipes, different refrigerating capacities, ascending pipes as well as partial-load operation, an exact pipe system calculation is necessary. The indicated pipe outer dimensions have been calculated using standard software.

The following tables are a voluntary service by Schiessl-Kälteges.m.b.H for its customers and no legal claims can be derived out of it.

Suction line

t ₀ [°C]	+5					±0					-5					-10					-30					
Q ₀	equivalent pipe length [m]																									
[W]	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	
800	10	12	12	12	12	12	12	12	12	16	12	12	12	16	16	12	12	16	16	16	16	16	16	18	18	22
1000	12	12	12	16	16	12	16	16	16	16	12	16	16	16	16	12	16	16	16	16	16	16	18	18	22	22
1,200	12	12	16	16	16	12	16	16	16	16	12	16	16	16	16	16	16	16	18	18	18	18	18	22	22	28
1.500	12	16	16	16	16	16	16	16	16	18	16	16	16	18	18	16	16	18	18	18	18	18	22	22	22	28
2.000	16	16	16	18	18	16	16	18	18	18	16	18	18	18	22	16	18	22	22	22	22	22	22	22	28	28
2.500	16	16	18	18	22	16	18	18	18	22	16	18	22	22	22	18	22	22	22	22	22	22	28	28	28	28
3.000	16	18	18	22	22	16	18	22	22	22	18	22	22	22	22	18	22	22	22	22	22	28	28	28	35	
4.500	18	22	22	22	28	18	22	22	22	28	22	22	28	28	28	22	28	28	28	28	28	35	35	35	35	
6.000	22	22	28	28	28	22	22	28	28	28	22	28	28	28	28	22	28	28	28	35	35	35	35	42	42	
8.000	22	28	28	28	35	22	28	28	28	35	28	28	28	35	35	28	28	35	35	35	35	42	42	42	42	
10.000	28	28	28	28	35	28	28	28	28	35	28	28	35	35	35	28	35	35	35	42	42	42	42	54	54	
12.000	28	28	35	35	35	28	28	35	35	35	28	35	35	35	42	35	35	35	42	42	42	42	54	54	54	
15.000	28	35	35	35	42	28	35	35	35	42	35	35	35	42	42	35	35	42	42	42	42	54	54	54	54	
20.000	35	35	42	42	42	35	35	42	42	42	35	42	42	42	42	42	42	42	54	54	54	54	64	64	64	
25.000	35	42	42	42	54	35	42	42	42	54	42	42	42	54	54	42	42	54	54	54	54	64	64	64	64	
30.000	42	42	42	54	54	42	42	42	54	54	42	42	54	54	54	54	54	54	54	54	54	64	64	64	76	
45.000	42	54	54	54	54	54	54	54	54	54	54	54	54	64	64	54	54	64	64	64	64	76	76	76	89	
60.000	54	54	64	64	64	54	54	64	64	64	54	64	64	64	64	64	64	64	64	64	76	76	89	89	89	
80.000	54	64	64	64	64	64	64	64	64	76	64	64	64	76	76	76	76	76	76	76	89	89	89	108	108	
100.000	64	64	64	76	76	64	64	76	76	76	76	76	76	76	76	76	76	89	89	89	89	108	108	108	108	

Liquid line

Q ₀	pipe length [m]					
[W]	10	20	30	40	50	*)
800	6	6	6	8	8	8
1.000	6	6	8	8	8	8
1.200	6	8	8	8	8	8
1.500	8	8	8	8	8	10
2.000	8	8	8	8	10	10
2.500	8	8	8	10	10	10
3.000	8	10	10	10	10	12
4.500	10	10	10	12	12	12
6.000	10	10	12	12	12	16
8.000	10	12	12	12	16	16
10.000	12	12	12	16	16	16
12.000	12	16	16	16	16	18
15.000	12	16	16	16	18	18
20.000	16	16	16	18	18	22
25.000	16	18	18	22	22	22
30.000	16	18	22	22	22	28
45.000	18	22	28	28	28	35
60.000	22	28	28	28	28	35
80.000	28	28	35	35	35	42
100.000	28	35	35	35	35	54

*) Pipe cross-section for condensation lines

Pressure line

Q ₀	pipe length [m]				
[W]	10	20	30	40	50
800	8	10	10	10	12
1.000	10	10	12	12	12
1.200	10	12	12	12	12
1.500	10	12	12	12	12
2.000	12	12	12	16	16
2.500	12	12	16	16	16
3.000	12	16	16	16	16
4.500	16	16	16	18	18
6.000	16	16	18	18	22
8.000	16	18	22	22	22
10.000	18	22	22	22	28
12.000	18	22	22	28	28
15.000	22	22	28	28	28
20.000	22	28	28	28	35
25.000	28	28	28	35	35
30.000	28	28	35	35	35
45.000	35	35	42	42	42
60.000	35	42	42	42	42
80.000	42	42	54	54	54
100.000	42	54	54	54	54

Pipe dimensioning R 404A / R 507

The indicated values are **reference values**.

For widely branched pipes, different refrigerating capacities, ascending pipes as well as partial-load operation an exact pipe system calculation is necessary. The indicated pipe outer dimensions have been calculated with standard software.

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Suction line

t ₀ [°C]	+5					±0					-5					-10					-30					
Q ₀	equivalent pipe length [m]																									
[W]	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	10	20	30	40	50	
800	10	10	12	12	12	10	12	12	12	12	10	12	12	12	12	10	12	12	12	12	12	16	16	16	16	16
1000	10	12	12	12	12	10	12	12	12	12	12	12	12	12	16	12	12	12	16	16	16	16	16	16	16	18
1.200	10	12	12	12	16	12	12	12	16	16	12	12	16	16	16	12	12	16	16	16	16	16	16	18	18	18
1.500	12	12	16	16	16	12	16	16	16	16	12	16	16	16	16	12	16	16	16	16	16	16	18	18	22	22
2.000	12	16	16	16	16	12	16	16	16	16	16	16	16	16	18	16	16	16	18	18	18	18	18	22	22	22
2.500	16	16	16	16	16	16	16	16	16	18	16	16	16	18	18	16	16	18	18	18	18	18	22	22	22	28
3.000	16	16	16	18	18	16	16	18	18	18	16	18	18	18	22	16	18	18	22	22	22	22	22	22	28	28
4.500	16	18	18	22	22	16	18	22	22	22	18	22	22	22	22	18	22	22	22	22	22	28	28	28	28	28
6.000	18	18	22	22	22	18	22	22	22	22	18	22	22	22	28	22	22	22	28	28	28	28	28	35	35	35
8.000	18	22	22	28	28	22	22	22	28	28	22	22	28	28	28	22	28	28	28	28	28	35	35	35	35	35
10.000	22	22	28	28	28	22	28	28	28	28	22	28	28	28	28	28	28	28	28	35	35	35	35	42	42	42
12.000	22	28	28	28	28	22	28	28	28	28	28	28	28	35	35	28	28	35	35	35	35	35	42	42	42	42
15.000	28	28	28	28	35	28	28	28	35	35	28	28	35	35	35	28	35	35	35	35	35	42	42	42	54	54
20.000	28	28	35	35	35	28	35	35	35	35	28	35	35	35	42	35	35	35	42	42	42	42	54	54	54	54
25.000	28	35	35	35	42	28	35	35	42	42	35	35	42	42	42	35	35	42	42	42	42	54	54	54	54	54
30.000	35	35	35	42	42	35	35	42	42	42	35	42	42	42	42	35	42	42	42	42	54	54	54	54	64	64
45.000	35	42	42	54	54	42	42	42	54	54	42	42	54	54	54	42	54	54	54	54	54	64	64	64	64	76
60.000	42	42	54	54	54	42	54	54	54	54	42	54	54	54	54	42	54	54	54	54	64	64	76	76	76	76
80.000	42	54	54	54	64	54	54	54	54	64	54	54	64	64	64	54	54	64	64	64	64	76	89	89	89	89
100.000	54	54	54	64	64	54	54	64	64	64	54	64	64	64	76	64	64	64	76	76	76	89	89	89	89	89

Liquid line

Q ₀	pipe length [m]					
[W]	10	20	30	40	50	*)
800	6	6	8	8	8	8
1.000	6	8	8	8	8	8
1.200	6	8	8	8	8	10
1.500	8	8	8	8	8	10
2.000	8	8	8	10	10	10
2.500	8	10	10	10	10	10
3.000	10	10	10	10	10	12
4.500	10	10	12	12	12	12
6.000	12	12	12	12	12	16
8.000	12	12	12	16	16	16
10.000	12	12	16	16	16	18
12.000	16	16	16	16	16	18
15.000	16	16	16	18	18	22
20.000	18	18	18	18	22	28
25.000	18	18	18	22	22	28
30.000	22	22	22	22	22	28
45.000	22	22	28	28	28	35
60.000	28	28	28	28	28	42
80.000	28	28	35	35	35	54
100.000	35	35	35	35	35	54

Pressure line

Q ₀	pipe length [m]				
[W]	10	20	30	40	50
800	8	10	10	10	10
1.000	10	10	10	10	10
1.200	10	10	10	12	12
1.500	10	10	12	12	12
2.000	10	12	12	12	12
2.500	12	12	12	12	16
3.000	12	12	16	16	16
4.500	12	16	16	16	16
6.000	16	16	16	18	18
8.000	16	16	18	18	18
10.000	16	18	18	22	22
12.000	18	18	22	22	22
15.000	18	22	22	22	28
20.000	22	22	28	28	28
25.000	22	28	28	28	28
30.000	22	28	28	28	35
45.000	28	28	35	35	35
60.000	28	35	35	42	42
80.000	35	35	42	42	42
100.000	35	42	42	54	54

*) Pipe cross-section for condensation lines

