LENNOX

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Design criteria for refrigerant piping
[version 1.1]

Piping for refrigerating systems should be designed according to 3 main principles:

1. reduction of the pressure drops to avoid significant decrease of the performances

2. ensure correct oil return also at partial load, when the refrigerant speed is reduced. Please note that the pressure drop depends also on the surface friction between gas and pipe. Surface friction is the "engine" for the oil drag. The oil drag is much critical in the suction line because of the lower temperatures and of the consequent higher oil viscosity.

3. avoid the making of "flash vapours" on the liquid line and consequent dysfunction of the expansion valve. Avoid having high liquid speeds to avoid pressure peaks when the solenoid valve is closing.

General Parameters

- minimum gas speed to ensure oil drag even in vertical piping, for discharge lines is 4 m/s
- minimum gas speed to ensure oil drag even in vertical piping, for suction lines is 5 m/s
- for liquid line, the miscibility between oil and refrigerant is 100 % (in our T field) so that no minimum speed is required.

In the following pages are shown the tables with all the most important parameters, for the whole range of models.

INNOV@ units											
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Model		**060**	**080**	**100**	**110**	**130**	**132***	**160**	**190**	**205**	**212***
T ev. Dew Point	[°C]	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / + 10	0 / +10	0 / +10	0 / +10	0 / +10
Base refrigerant charge (only internal unit)	[kg]	1,17	1,17	1,64	1,64	1,64	1,03	2,19	2,19	2,19	1,31
Base refrigerant charge with external unit:											
Standard	[kg]	1,47	2,60	3,07	3,07	3,63	1,90	4,18	3,62	5,41	2,84
Compact	[kg]	-	2,04	2,51	2,51	2,51	1,34	3,05	3,62	4,46	2,32
Oversized	[kg]	2,04	3,45	3,92	3,92	4,76	2,47	5,30	5,41	7,15	3,75
Low noise	[kg]	2,04	3,45	3,92	3,92	3,92	2,05	4,28	5,41	5,47	2,91
Low noise compact	[kg]	1,75	2,60	3,07	3,07	3,07	1,62	3,62	4,46	5,41	2,84
Low noise oversized	[kg]	2,60	4,40	4,87	4,87	4,87	2,57	5,47	7,15	8,95	4,73
Additional refrigerant charge:											
0-10 m	**Discharge gas line**	[in(mm)]	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	1/2 (12,7)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	1/2 (12,7)
	Liquid line		3/8 (9,5)	3/8 (9,5)	3/8 (9,5)	3/8 (9,5)	1/2 (12,7)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	3/8 (9,5)
	Refrigerant addition x line metre	[kg]	0,05	0,05	0,05	0,05	0,10	0,05	0,10	0,11	0,17	0,05
	Oil addition x single siphon* **	[g]	10	10	10	10	20	10	20	34	34	10
11-20 m	**Discharge gas line**	[in(mm)]	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	1/2 (12,7)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	1/2 (12,7)
	Liquid line		3/8 (9,5)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	3/8 (9,5)
	Refrigerant addition x line metre	[kg]	0,05	0,05	0,10	0,10	0,11	0,05	0,11	0,11	0,17	0,05
	Oil addition x single siphon* **	[g]	10	10	20	20	34	10	34	34	34	10
21-30 m	**Discharge gas line**	[in(mm)]	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	1/2 (12,7)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	1/2 (12.7)
	Liquid line		3/8 (9,5)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	3/8 (9,5)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/8 (9.5)
	Refrigerant addition x line metre	[kg]	0,05	0,05	0,10	0,10	0,11	0,05	0,11	0,17	0,17	0,05
	Oil addition x single siphon* **	[g]	10	10	20	20	34	10	34	34	54	10
Refrigerant compressor limit**		[kg]	4,9	4,9	8,3	11,3	11,3	4,9	11,3	11,3	11,3	11,3
Compressor brand***			Copeland	Copeland	Copeland	Panasonic	Panasonic	Copeland	Panasonic	Panasonic	Panasonic	Panasonic
Suggested oil type***			ICI Emkarate RL 32 3MAF	ICI Emkarate RL 32 3MAF	ICI Emkarate RL 32 3MAF	FV68S	FV68S	ICI Emkarate RL 32 3MAF	FV68S	FV68S	FV68S	FV68S

Note:

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

INNOV@ units (1/2)										
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Model		**201**	**251**	**272***	**281**	**302***	**311**	**362***	**401**	**422***
T ev. Dew Point	[°C]	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10
Base refrigerant charge (only internal unit)	[kg]	5,19	5,64	4,72	6,37	4,72	6,37	4,72	6,91	5,18
Base refrigerant charge with external unit:										
Standard	[kg]	7,47	8,87	6,25	9,59	6,33	9,65	6,33	13,55	8,47
Compact	[kg]	6,62	7,07	5,74	8,64	5,69	8,46	6,25	10,19	6,79
Oversized	[kg]	8,48	10,61	7,17	11,33	8,90	10,54	6,64	12,18	7,65
Low noise	[kg]	8,42	8,93	6,33	9,65	6,88	10,76	6,88	11,08	7,10
Low noise compact	[kg]	7,28	8,87	6,25	9,59	6,33	9,65	6,33	11,30	7,34
Low noise oversized	[kg]	11,96	12,41	8,14	13,13	8,15	13,55	8,15	14,09	8,60
Additional refrigerant charge:										
0-10 m	**Discharge gas line**	[in(mm)]	3/4 (19,0)	3/4 (19,0)	5/8 (15,9)	7/8 (22,2)	3/4 (19,0)	7/8 (22,2)	3/4 (19,0)	1 1/8 (28,6)	7/8 (22,2)
	Liquid line		5/8 (15,9)	5/8 (15,9)	1/2 (12,7)	3/4 (19,0)	5/8 (15,9)	3/4 (19,0)	5/8 (15,9)	7/8 (22,2)	5/8 (15,9)
	Refrigerant addition x line metre	[kg]	0,17	0,17	0,10	0,25	0,17	0,25	0,17	0,33	0,17
	Oil addition x single siphon* **	[g]	34	34	20	54	34	54	34	115	54
11-20 m	**Discharge gas line**	[in(mm)]	3/4 (19,0)	7/8 (22,2)	5/8 (15,9)	7/8 (22,2)	3/4 (19,0)	7/8 (22,2)	3/4 (19,0)	1 1/8 (28,6)	7/8 (22,2)
	Liquid line		5/8 (15,9)	5/8 (15,9)	1/2 (12,7)	3/4 (19,0)	5/8 (15,9)	3/4 (19,0)	5/8 (15,9)	7/8 (22,2)	5/8 (15,9)
	Refrigerant addition x line metre	[kg]	0,17	0,17	0,10	0,25	0,17	0,25	0,17	0,33	0,17
	Oil addition x single siphon* **	[g]	34	54	20	54	34	54	34	115	54
21-30 m	**Discharge gas line**	[in(mm)]	7/8 (22,2)	7/8 (22,2)	5/8 (15,9)	7/8 (22,2)	3/4 (19,0)	7/8 (22,2)	3/4 (19,0)	1 1/8 (28,6)	7/8 (22.2)
	Liquid line		5/8 (15,9)	5/8 (15,9)	1/2 (12,7)	3/4 (19,0)	5/8 (15,9)	3/4 (19,0)	5/8 (15,9)	7/8 (22,2)	5/8 (15.9)
	Refrigerant addition x line metre	[kg]	0,17	0,17	0,10	0,25	0,17	0,25	0,17	0,33	0,17
	Oil addition x single siphon* **	[g]	54	54	20	54	34	54	34	115	54
Refrigerant compressor limit**		[kg]	11,3	20,0	11,3	22,0	11,3	22,0	11,3	22,0	11,3
Compressor brand***			Panasonic	Danfoss	Panasonic	Danfoss	Panasonic	Danfoss	Panasonic	Danfoss	Panasonic
Suggested oil type***			FV68S	Oil Maneurop 160SZ	FV68S	Oil Maneurop 160SZ	FV68S	Oil Maneurop 160SZ	FV68S	Oil Maneurop 160SZ	FV68S

Note:

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

INNOV@ units (2/2)										
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Model		**452***	**532***	**592***	**602***	**692***	**762***	**852**	**1002***	**1204***
T ev. Dew Point	[°C]	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10
Base refrigerant charge (only internal unit)	[kg]	5,18	5,47	5,47	6,07	6,07	6,07	8,00	8,00	9,02
Base refrigerant charge with external unit:										
Standard	[kg]	8,47	7,94	7,94	8,54	9,16	9,16	13,36	13,36	14,76
Compact	[kg]	6,79	8,75	8,75	9,36	8,54	8,54	11,42	11,42	12,11
Oversized	[kg]	10,55	10,83	10,83	11,80	11,80	11,80	17,68	17,68	18,71
Low noise	[kg]	7,10	8,15	8,15	8,75	12,40	12,40	13,21	13,21	18,71
Low noise compact	[kg]	7,34	7,39	7,39	7,99	8,75	8,75	11,42	11,42	14,23
Low noise oversized	[kg]	8,60	10,68	10,68	15,75	15,75	15,75	17,68	17,68	-
Additional refrigerant charge:										
0-10 m	**Discharge gas line**	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 3/8 (34,9)
	Liquid line [in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)
	Refrigerant addition x line metre [kg]	0,17	0,25	0,25	0,25	0,25	0,33	0,33	0,33	0,36
	Oil addition x single siphon*** [g]	54	54	54	54	54	115	115	115	210
11-20 m	**Discharge gas line**	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 3/8 (34,9)
	Liquid line [in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)
	Refrigerant addition x line metre [kg]	0,17	0,25	0,25	0,33	0,33	0,33	0,33	0,33	0,36
	Oil addition x single siphon*** [g]	54	54	54	115	115	115	115	115	210
21-30 m	**Discharge gas line**	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 1/8 (28,6)	1 3/8 (34.9)
	Liquid line [in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22.2)
	Refrigerant addition x line metre [kg]	0,17	0,25	0,25	0,33	0,33	0,33	0,33	0,33	0,36
	Oil addition x single siphon*** [g]	54	54	54	115	115	115	115	115	210
Refrigerant compressor limit**	[kg]	20,0	22,0	22,0	22,0	22,0	22,0	22,0	21,7	44,0
Compressor brand****		Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Copeland	Danfoss
Suggested oil type****		Oil Maneurop 160SZ	Oil Maneurop 160SZ	Oil Maneurop 160SZ	Oil Maneurop 160SZ	Oil Maneurop 160SZ	Oil Maneurop 160SZ	Oil Maneurop 160SZ	ICI Emkarate RL 32 3MAF	Oil Maneurop 160SZ

Note:

Note:

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

INNOV@ units (1/3)							
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A
Model		**0091**	**0131**	**0201**	**0251**	**0301**	**0381**
T ev. Dew Point	[°C]	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15
Base refrigerant charge (only internal unit)	[kg]	1,17	1,63	5,76	5,76	6,49	6,49
Base refrigerant charge with external unit:							
Standard	[kg]	2,60	3,63	7,19	8,04	9,71	9,77
Compact	[kg]	2,04	2,50	6,62	7,75	8,76	9,71
Oversized	[kg]	3,45	4,75	8,99	10,11	11,45	10,66
Low noise	[kg]	3,45	3,91	7,85	8,99	9,77	9,91
Low noise compact	[kg]	2,60	3,06	7,19	8,04	9,71	11,45
Low noise oversized	[kg]	4,40	4,86	10,72	10,72	13,25	13,67
Additional refrigerant charge:							
0-10 m **Discharge gas line** **Horizontal**	[in(mm)]	3/8 (9,5)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)
0-10 m **Discharge gas line** **Vertical**	[in(mm)]	3/8 (9,5)	3/8 (9,5)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)
0-10 m **Liquid line**	[in(mm)]	3/8 (9.5)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)
0-10 m **Refrigerant addition x line metre**	[kg]	0,05	0,05	0,10	0,10	0,17	0,17
0-10 m **Oil addition x single siphon*** **	[g]	4	4	10	20	20	20
11-20 m **Discharge gas line** **Horizontal**	[in(mm)]	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)
11-20 m **Discharge gas line** **Vertical**	[in(mm)]	3/8 (9,5)	3/8 (9,5)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)
11-20 m **Liquid line**	[in(mm)]	3/8 (9.5)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)
11-20 m **Refrigerant addition x line metre**	[kg]	0,05	0,05	0,10	0,10	0,17	0,17
11-20 m **Oil addition x single siphon*** **	[g]	4	4	20	20	20	34
21-30 m **Discharge gas line** **Horizontal**	[in(mm)]	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	3/4 (19.0)
21-30 m **Discharge gas line** **Vertical**	[in(mm)]	3/8 (9,5)	3/8 (9,5)	5/8 (15,9)	5/8 (15,9)	5/4 (19,0)	3/4 (19.0)
21-30 m **Liquid line**	[in(mm)]	3/8 (9.5)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)
21-30 m **Refrigerant addition x line metre**	[kg]	0,05	0,05	0,10	0,10	0,17	0,17
21-30 m **Oil addition x single siphon*** **	[g]	4	4	20	20	34	34
Refrigerant compressor limit**	[kg]	3,8	2,7	7,3	8,7	8,7	10,5
Compressor brand***		LG	Mitsubishi Siam	Danfoss	Danfoss	Danfoss	Danfoss
Suggested oil type***		FVC68D	FV50S	160HV	160HV	160HV	160HV

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

INNOV@ units (2/3)							
Refrigerant		R410A	R410A	R410A	R410A	R410A	R410A
Model		**0441**	**0501**	**0551**	**0641**	**0701**	**0801**
T ev. Dew Point	[°C]	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15
Base refrigerant charge (only internal unit)	[kg]	6,49	7,84	7,84	10,28	10,28	11,82
Base refrigerant charge with external unit:							
Standard	[kg]	9,77	12,80	12,02	14,46	17,46	19,00
Compact	[kg]	9,71	11,13	12,80	15,24	14,46	16,00
Oversized	[kg]	10,66	12,02	14,34	16,78	22,08	23,61
Low noise	[kg]	10,66	12,02	15,02	17,46	23,27	24,81
Low noise compact	[kg]	9,91	11,27	11,27	13,71	17,46	19,00
Low noise oversized	[kg]	13,67	15,02	18,59	21,03	29,98	31,51
Additional refrigerant charge:							
0-10 m **Discharge gas line** **Horizontal**	[in(mm)]	3/4 (19.0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)	7/8 (22.2)
0-10 m **Discharge gas line** **Vertical**	[in(mm)]	3/4 (19.0)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22.2)
0-10 m **Liquid line**	[in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)
0-10 m **Refrigerant addition x line metre**	[kg]	0,17	0,24	0,24	0,25	0,30	0,30
0-10 m **Oil addition x single siphon*** **	[g]	34	34	34	34	54	54
11-20 m **Discharge gas line** **Horizontal**	[in(mm)]	7/8 (22.2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	1 1/8 (28,6)	1 1/8 (28.6)
11-20 m **Discharge gas line** **Vertical**	[in(mm)]	3/4 (19.0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)	7/8 (22.2)
11-20 m **Liquid line**	[in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22,2)
11-20 m **Refrigerant addition x line metre**	[kg]	0,17	0,25	0,25	0,25	0,33	0,33
11-20 m **Oil addition x single siphon*** **	[g]	34	34	34	54	54	54
21-30 m **Discharge gas line** **Horizontal**	[in(mm)]	7/8 (22.2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	1 1/8 (28.6)	1 1/8 (28.6)
21-30 m **Discharge gas line** **Vertical**	[in(mm)]	7/8 (22.2)	7/8 (22,2)	7/8 (22,2)	7/8 (22,2)	7/8 (22.2)	1 1/8 (28.6)
21-30 m **Liquid line**	[in(mm)]	5/8 (15.9)	3/4 (19,0)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	7/8 (22.2)
21-30 m **Refrigerant addition x line metre**	[kg]	0,17	0,25	0,25	0,25	0,33	0,33
21-30 m **Oil addition x single siphon*** **	[g]	54	54	54	54	54	115
Refrigerant compressor limit**	[kg]	10,5	10,5	25,3	25,3	27,3	27,3
Compressor brand***		Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Danfoss
Suggested oil type***		160HV	160HV	160SZ	160SZ	160SZ	160SZ

Note:

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

INNOV@ units (3/3)									
Refrigerant		R410A		R410A		R410A		R410A	
Model		**0852***		**0962***		**1003***		**1103***	
T ev. Dew Point	[°C]	0 / +15		0 / +15		0 / +15		0 / +15	
Base refrigerant charge (only internal unit)	[kg]	6,85		6,85		6,85		6,85	
Base refrigerant charge with external unit:									
Standard	[kg]	9,94		12,21		12,58		12,58	
Compact	[kg]	8,77		10,27		9,94		12,21	
Oversized	[kg]	12,58		12,58		16,53		16,53	
Low noise	[kg]	13,17		13,19		13,19		16,53	
Low noise compact	[kg]	10,27		13,17		13,17		13,19	
Low noise oversized	[kg]	16,53		16,53		-		-	
Additional refrigerant charge:									
0-10 m	**Discharge gas line Horizontal**	[in(mm)]	3/4 (19,0)		3/4 (19,0)		3/4 (19,0)		7/8 (22.2)
	Discharge gas line Vertical		3/4 (19,0)		3/4 (19,0)		3/4 (19,0)		7/8 (22.2)
	Liquid line		5/8 (15.9)		3/4 (19,0)		3/4 (19,0)		7/8 (22,2)
	Refrigerant addition x line metre	[kg]	0,17		0,24		0,24		0,30
	Oil addition x single siphon* **	[g]	34		34		34		54
11-20 m	**Discharge gas line Horizontal**	[in(mm)]	3/4 (19,0)		3/4 (19,0)		3/4 (19,0)		7/8 (22.2)
	Discharge gas line Vertical		3/4 (19,0)		3/4 (19,0)		3/4 (19,0)		7/8 (22.2)
	Liquid line		5/8 (15.9)		3/4 (19,0)		3/4 (19,0)		7/8 (22,2)
	Refrigerant addition x line metre	[kg]	0,17		0,24		0,24		0,30
	Oil addition x single siphon* **	[g]	34		34		34		54
21-30 m	**Discharge gas line Horizontal**	[in(mm)]	3/4 (19,0)		3/4 (19,0)		3/4 (19,0)		7/8 (22.2)
	Discharge gas line Vertical		3/4 (19,0)		3/4 (19,0)		3/4 (19,0)		7/8 (22.2)
	Liquid line		5/8 (15.9)		3/4 (19,0)		3/4 (19,0)		7/8 (22,2)
	Refrigerant addition x line metre	[kg]	0,17		0,24		0,24		0,30
	Oil addition x single siphon* **	[g]	34		34		34		54
Refrigerant compressor limit**	[kg]	Inverter 10,5	On-Off 22,0	Inverter 10,5	On-Off 22,0	Inverter 25,3	On-Off 40,0	Inverter 27,3	On-Off 44,0
Compressor brand***		Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	Danfoss
Suggested oil type***		160HV	160SZ	160HV	160SZ	160SZ	160SZ	160SZ	160SZ

Note:

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

Energy (PHASE OUT UNITS)						
Refrigerant		R410A	R410A	R410A	R410A	R410A
Model		**0241**	**0341**	**0462***	**0682***	**0902***
T ev. Dew Point	[°C]	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15
Base refrigerant charge (only internal unit)	[kg]	5,64	6,37	5,47	6,07	8,00
Base refrigerant charge with external unit:						
Standard	[kg]	8,87	10,72	8,75	8,54	13,36
Compact	[kg]	7,92	9,48	7,08	9,36	11,42
Oversized	[kg]	10,61	13,01	8,89	11,43	13,73
Low noise	[kg]	8,93	10,76	7,39	12,40	13,21
Low noise compact	[kg]	8,87	9,65	7,02	8,75	11,42
Low noise oversized	[kg]	12,41	13,55	8,89	15,75	17,68
Additional refrigerant charge:						
0-10 m	**Discharge gas line Horizontal**	[in(mm)]	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)
	Discharge gas line Vertical		1/2 (12,7)	5/8 (15,9)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)
	Liquid line		1/2 (12,7)	5/8 (15,9)	1/2 (12.7)	5/8 (15,9)	5/8 (15.9)
	Refrigerant addition x line metre	[kg]	0,10	0,16	0,10	0,16	0,16
	Oil addition x single siphon* **	[g]	10	20	10	20	20
11-20 m	**Discharge gas line Horizontal**	[in(mm)]	5/8 (15,9)	3/4 (19,0)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)
	Discharge gas line Vertical		5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)
	Liquid line		1/2 (12,7)	5/8 (15,9)	1/2 (12.7)	5/8 (15,9)	5/8 (15.9)
	Refrigerant addition x line metre	[kg]	0,10	0,17	0,10	0,17	0,17
	Oil addition x single siphon* **	[g]	20	20	20	20	20
21-30 m	**Discharge gas line Horizontal**	[in(mm)]	5/8 (15,9)	3/4 (19,0)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)
	Discharge gas line Vertical		5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)
	Liquid line		1/2 (12,7)	5/8 (15,9)	1/2 (12.7)	5/8 (15,9)	5/8 (15.9)
	Refrigerant addition x line metre	[kg]	0,10	0,17	0,10	0,17	0,17
	Oil addition x single siphon* **	[g]	20	20	20	20	20
Refrigerant compressor limit**		[kg]	9,3	15,3	9,3	15,3	15,3
Compressor brand***			Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam
Suggested oil type***			FV50S	FV50S	FV50S	FV50S	FV50S

Note:

(*) ***All values for double circuit units are referred to a single circuit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

RHD units

Refrigerant			R410A	R410A	R410A	R410A	R410A	R410A
Model			**0100**	**0200**	**0260**	**0300**	**0400**	**0450**
T ev. Dew Point		[°C]	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15	0 / +15
Base refrigerant charge (only internal unit)		[kg]	1,30	2,71	5,01	3,15	5,01	5,01
Base refrigerant charge with external unit:								
Standard		[kg]	2,73	4,99	8,24	6,38	9,97	9,97
Compact		[kg]	2,17	3,58	6,44	5,42	9,36	8,29
Oversized		[kg]	3,57	7,07	9,97	8,11	9,19	9,19
Low noise		[kg]	2,73	5,94	8,29	8,11	9,40	9,19
Low noise compact		[kg]	2,73	4,99	8,24	6,38	8,29	9,40
Low noise oversized		[kg]	4,52	7,68	11,77	7,33	12,19	12,19
Additional refrigerant charge:								
0-10 m	**Discharge gas line**	**Horizontal**	[in(mm)]	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	3/4 (19.0)
		Vertical		3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19.0)
	Liquid line			3/8 (9.5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)
	Refrigerant addition x line metre		[kg]	0,05	0,10	0,10	0,17	0,17	0,17
	Oil addition x single siphon* **		[kg]	4	10	10	20	20	34
11-20 m	**Discharge gas line**	**Horizontal**	[in(mm)]	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	7/8 (22.2)
		Vertical		3/8 (9,5)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	3/4 (19.0)
	Liquid line			3/8 (9.5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)
	Refrigerant addition x line metre		[kg]	0,05	0,10	0,10	0,17	0,17	0,25
	Oil addition x single siphon* **		[g]	4	20	20	20	20	34
21-30 m	**Discharge gas line**	**Orizzontale**	[in(mm)]	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	7/8 (22.2)
		Verticale		3/8 (9,5)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	5/8 (15,9)	3/4 (19.0)
	Liquid line			3/8 (9.5)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)	3/4 (19,0)
	Refrigerant addition x line metre		[kg]	0,05	0,10	0,10	0,17	0,17	0,25
	Oil addition x single siphon* **		[g]	4	20	20	20	20	34
Refrigerant compressor limit**			[kg]	2,3	9.3	9,3	9,3	9,3	15,3
Compressor brand***				LG	Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam
Suggested oil type***				FVC68D	FV50S	FV50S	FV50S	FV50S	FV50S

Note:

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) **For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).**

RHV units					
Refrigerant			R410A	R410A	R410A
Model			**0140***	**0240**	**0330**
T ev. Dew Point		[°C]	0 / +10	0 / +10	0 / +10
Split valve connections	**IN**	[in]	5/8”	7/8”	7/8”
	OUT		1/2”	5/8”	5/8”
ODS connections	**IN**	[mm]	16	22	22
	OUT		12	16	16
Base refrigerant charge		[kg]	2,0	10,0	12,5
0-10 m	**Suction line**	[in(mm)]	5/8 (15,9)	3/4 (19,0)	7/8 (22,2)
	Liquid line		1/2 (12,7)	5/8 (15,9)	3/4 (19,0)
	Refrigerant addition x line metre	[kg]	0,10	0,16	0,25
	Oil addition x single siphon* **	[g]	20	34	54
11-20 m	**Suction line**	[in(mm)]	5/8 (15,9)	3/4 (19,0)	7/8 (22,2)
	Liquid line		1/2 (12,7)	5/8 (15,9)	3/4 (19,0)
	Refrigerant addition x line metre	[kg]	0,10	0,16	0,25
	Oil addition x single siphon* **	[g]	20	34	54
21-30 m	**Suction line**	[in(mm)]	5/8 (15,9)	7/8 (22,2)	7/8 (22,2)
	Liquid line		1/2 (12,7)	3/4 (19,0)	3/4 (19,0)
	Refrigerant addition x line metre	[kg]	0,10	0,25	0,25
	Oil addition x single siphon* **	[g]	20	54	54
Refrigerant compressor limit**		[kg]	6,7	12,7	15,3
Compressor brand***			Mitsubishi Siam	Mitsubishi Siam	Mitsubishi Siam
Suggested oil type***			FV50S	FV50S	FV50S

Note:

- ***The lines diameters do not always match to the unit connections.***
- ***Max difference height 10mt.***

(*) ***The units with rotary compressor are in warranty for pipe line more than 15mt long only with long distance kit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).

ADNOV@ units split for Telecom (1/2)								
Refrigerant			R410A	R410A	R410A	R410A	R410A	R410A
Model			**025***	**035***	**045***	**056**	**073**	**090**
T ev. Dew Point		[°C]	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10
Split valve connections	**IN**	[in]	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"
	OUT		3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
ODS connections	**IN**	[mm]	12	12	12	16	16	16
	OUT		10	10	10	10	10	10
Base refrigerant charge		[kg]	0,73	0,73	1,42	1,42	1,42	2,12
0-10 m	**Suction line**	[in(mm)]	3/8 (9,5)	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)
	Liquid line		5/16 (7,9)	5/16 (7,9)	5/16 (7,9)	3/8 (9,5)	3/8 (9,5)	1/2 (12,7)
	Refrigerant addition x line metre	[kg]	0,03	0,03	0,03	0,05	0,05	0,09
	Oil addition x single siphon* **	[g]	4	4	10	10	10	20
11-20 m	**Suction line**	[in(mm)]	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)
	Liquid line		5/16 (7,9)	5/16 (7,9)	5/16 (7,9)	3/8 (9,5)	3/8 (9,5)	1/2 (12,7)
	Refrigerant addition x line metre	[kg]	0,03	0,03	0,03	0,05	0,05	0,09
	Oil addition x single siphon* **	[g]	4	10	10	10	20	20
21-30 m	**Suction line**	[in(mm)]	3/8 (9,5)	1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	5/8 (15,9)
	Liquid line		5/16 (7,9)	5/16 (7,9)	5/16 (7,9)	3/8 (9,5)	3/8 (9,5)	1/2 (12,7)
	Refrigerant addition x line metre	[kg]	0,03	0,03	0,03	0,04	0,05	0,09
	Oil addition x single siphon* **	[g]	4	10	10	10	20	20
Refrigerant compressor limit**		[kg]	2,2	2,2	2,3	2,9	4,9	4,9
Compressor brand***			LG	LG	LG	Copeland	Copeland	Copeland
Suggested oil type***			FVC68D	FVC68D	FVC68D	ICI Emkarate RL 32 3MAF	ICI Emkarate RL 32 3MAF	ICI Emkarate RL 32 3MAF

Note:

- ***The lines diameters do not always match to the unit connections.***
- ***Max difference height 10mt.***

(*) ***The units with rotary compressor are in warranty for pipe line more than 15mt long only with long distance kit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).

ADNOV@ units split for Telecom (2/2)								
Refrigerant				R410A	R410A	R410A	R410A	R410A
Model				**105**	**120**	**145**	**310**	**381**
T ev. Dew Point			[°C]	0 / +10	0 / +10	0 / +10	0 / +10	0 / +10
Split valve connections	**IN**		[in]	5/8"	7/8"	7/8"	1 1/4"	1 1/4"
	OUT			3/8"	1/2"	1/2"	1"	1"
ODS connections	**IN**		[mm]	16	22	22	28	28
	OUT			10	12	12	16	16
Base refrigerant charge			[kg]	2,12	2,88	2,88	10,98	12,43
0-10 m	**Suction line**		[in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	1 1/8 (28,6)
	Liquid line			1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	3/4 (19,0)	7/8 (22,2)
	Refrigerant addition x line metre		[kg]	0,09	0,09	0,09	0,25	0,33
	Oil addition x single siphon* **		[g]	20	34	34	54	115
11-20 m	**Suction line**		[in(mm)]	5/8 (15,9)	3/4 (19,0)	3/4 (19,0)	1 1/8 (28,6)	1 1/8 (28,6)
	Liquid line			1/2 (12,7)	1/2 (12,7)	1/2 (12,7)	7/8 (22,2)	7/8 (22,2)
	Refrigerant addition x line metre		[kg]	0,09	0,09	0,09	0,33	0,33
	Oil addition x single siphon* **		[g]	20	34	34	115	115
21-30 m	**Suction line**		[in(mm)]	3/4 (19,0)	3/4 (19,0)	7/8 (22,2)	1 1/8 (28,6)	1 1/8 (28,6)
	Liquid line			1/2 (12,7)	1/2 (12,7)	5/8 (15,9)	7/8 (22,2)	7/8 (22,2)
	Refrigerant addition x line metre		[kg]	0,09	0,09	0,15	0,33	0,33
	Oil addition x single siphon* **		[g]	34	34	54	115	115
Refrigerant compressor limit**			[kg]	11,3	11,3	11,3	22,0	22,0
Compressor brand***				Copeland	Panasonic	Panasonic	Danfoss	Danfoss
Suggested oil type***				ICI Emkarate RL 32 3MAF	FV68S	FV68S	Oil Maneurop 160SZ	Oil Maneurop 160SZ

Note:

- ***The lines diameters do not always match to the unit connections.***
- ***Max difference height 10mt.***

(*) ***The units with rotary compressor are in warranty for pipe line more than 15mt long only with long distance kit.***

(**) ***If the total refrigerant charge (base charge + refrigerant addition due to line length) exceeds the refrigerant compressor limit, an oil charge of 50g, per exceeding refrigerant kg, must be added.***

(***) ***A siphon has to be installed on every 5m of vertical suction or discharge line.***

(****) For 60 Hz or special power supplies, the brand of the compressors may differ from the one indicated. Check the brand of the installed compressors and use the approved oil by the manufacturer (Tab.1).

Follows the choice criteria in terms of diameter, material and thickness that is implemented in compliance with the indications provided in EN12735_1 _2 and EN14276_2 on copper pipes for cooling and conditioning systems and machinery.

The table 4 below indicates, for each diameter, the calculation of the minimum pipe thickness in the curved and straight sections according to **EN14276_2:2011** at the minimum radius of curvature possible and pressure PT=50bar (take into account that the PS=45bar so PT=1,1XPS). *The pipe is oxide-free.*

Please consider the commercial thickness in the last column as minimum possible one

tab.4

DN	External diameter [mm]	Radius of curvature [mm]	PT [bar]	PED Category	copper σs [N/mm2]	Z	Min. Straight Thick. [mm]	Min. Curve Thick. [mm]	Commercial Thickness [mm]
6	6	12	50	A3 P3	100	0,85	0.179	0.285	1
6	8	16	50	A3 P3	100	0,85	0.239	0.265	1
6	10	20	50	A3 P3	100	0,85	0.298	0.331	1
8	12	24	50	A3 P3	100	0,85	0.358	0.397	1
10	16	26	50	A3 P3	100	0,85	0.477	0.529	1
15	18	18	50	A3 P3	100	0,85	0.537	0.595	1
20	22	33	50	A3 P3	100	0,85	0.657	0.728	1.5
25	28	42	50	A3 P3	100	0,85	0.836	0.926	1.5
32	35	52.5	50	A3 P3	100	0,85	1.045	1.158	1.5
32	42	65	50	A3 P3	100	0,85	1.253	1.389	1.5
50	54	108	50	CAT I	100	1	1.375	1.504	1.5
65	64*	89	29	CAT I	100	1	0.95	1.052	2
80	76*	152	29	CAT I	100	1	1.128	1.250	2
'*' = Used only as suction pipes in low pressure (PS=29bar-r)									

$$t = \frac{P \times D_e}{2 \times f \times z + 0{,}8 \times P}\left(1 + \frac{D_e}{4R}\right)$$

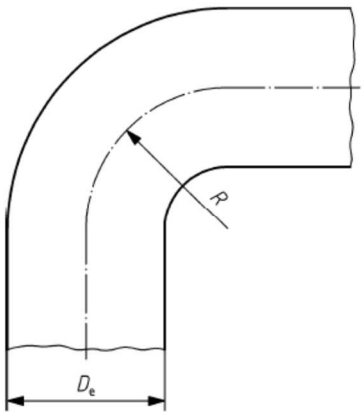


Figure 2 — Bend piping

Example:

Unit: **TADR 532 (double circuit unit)**
Line length: **25m (10m vertical)**

From the related table it is possible to find these values:

- **Discharge gas line diameter: 22.2 mm - 7/8”**
- **Liquid line diameter: 19.0 mm - 5/8”**
- **Base refrigerant charge (standard): 8.96 kg**
- **Base refrigerant charge (low noise): 9.97kg**
- **Refrigerant addiction per line meter 250 g/m**
- **Oil addiction for single siphon: 54 g**
- **Refrigerant compressor limit: 7.9 kg**

REFRIGERANT CHARGE

Refrigerant charge due to the line length
25 m x 250 g/m = 6.250 kg

line metre — **Refrigerant addiction per line metre**

Total refrigerant charge
6.250 kg + 8.96 kg = 15.210 kg

Refrigerant charge due to the line length — **Base refrigerant charge (standard)**

OIL ADDICTION

Vertical line 10m => 2 siphon

Oil addiction due to the siphon
54g x 2 = 108g

Refrigerant charge due to the line length — **N° of siphon**

over-limit refrigerant charge
15.210 kg – 7.9 kg = 7.310 kg

Total refrigerant charge — **Refrigerant compressor limit**

oil addiction due to the over-limit refrigerant charge
7.310 kg x 50 g/kg = 365 g

over-limit refrigerant charge — **Oil addiction per kg of refrigerant**

Total oil addiction
365 g + 108 g = 473 g

oil addiction due to the over-limit refrigerant charge — **Oil addiction due to the siphon**

(*) Calculated values are referred to a single circuit.

Refrigerant addition with flooding option

REFRIGERANT ADDITION WITH FLOODING OPTIONS			
Refrigerant		R410A	R410A
Model		**DM**	**DH***
External flooding kit	[kg]	4.5	4.5
Internal flooding kit	[kg]	4.0	1.7

(*) All values for double circuit units are referred to a single circuit.

Refrigerant addition with low temperature option

REFRIGERANT ADDITION WITH LOW TEMPERATURE OPTIONS						
Refrigerant		R410A				
Unit		**THC**				
Model (from-to)		**025-035**	**045-105**	**120-145**	**310**	**380**
Refrigerant addition	[kg]	1,63	2,76	4,38	-	2,83

REFRIGERANT ADDITION WITH LOW TEMPERATURE OPTIONS				
Refrigerant		R410A		
Unit		**MTCI**		
Model		**140**	**240**	**330**
Refrigerant addition	[kg]	2,76	-	2,83

Special Precautions for long lines

1. In the below table there are a special options in according to the length line and type of unit.

Unit		DM	DH	iNRG0091-0131	All iNRG except 0091-0131
20m < L > 30m	Mandatory check valve on the discharge side	To be order	To be order	To be order	To be order
	Mandatory solenoid valve on the liquid line	To be order	Already include	To be order	Already include
	Advisable check valve kit * on the liquid line	To be order	To be order	To be order	To be order
L > 30 m	Mandatory long distance kit	To be order	To be order	To be order	To be order
	Mandatory check valve on the discharge side	To be order	To be order	To be order	To be order
	Mandatory solenoid valve on the liquid line	To be order	Already include	To be order	Already include

* check valve kit is composed by check valve + bypass valve

2. Install piping according to the specification contained in this file

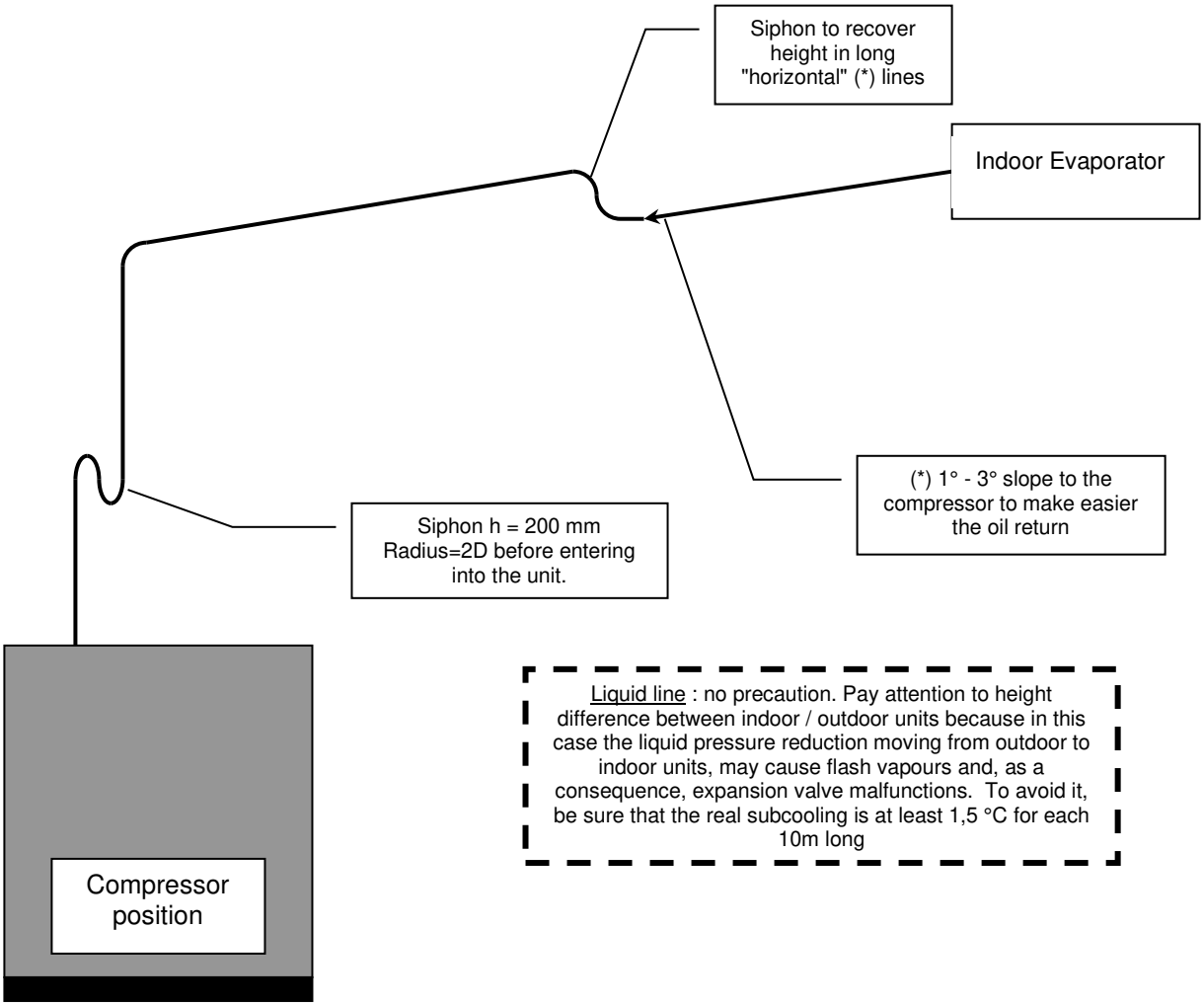
3. Long lines means higher refrigerant charge and consequently more oil diluition (3-5 % in weight of the refrigerant charge) → add oil to the system as specified in the previous tables.

From the previous tables, the refrigerant charge can be estimated with an accurancy of ±20%

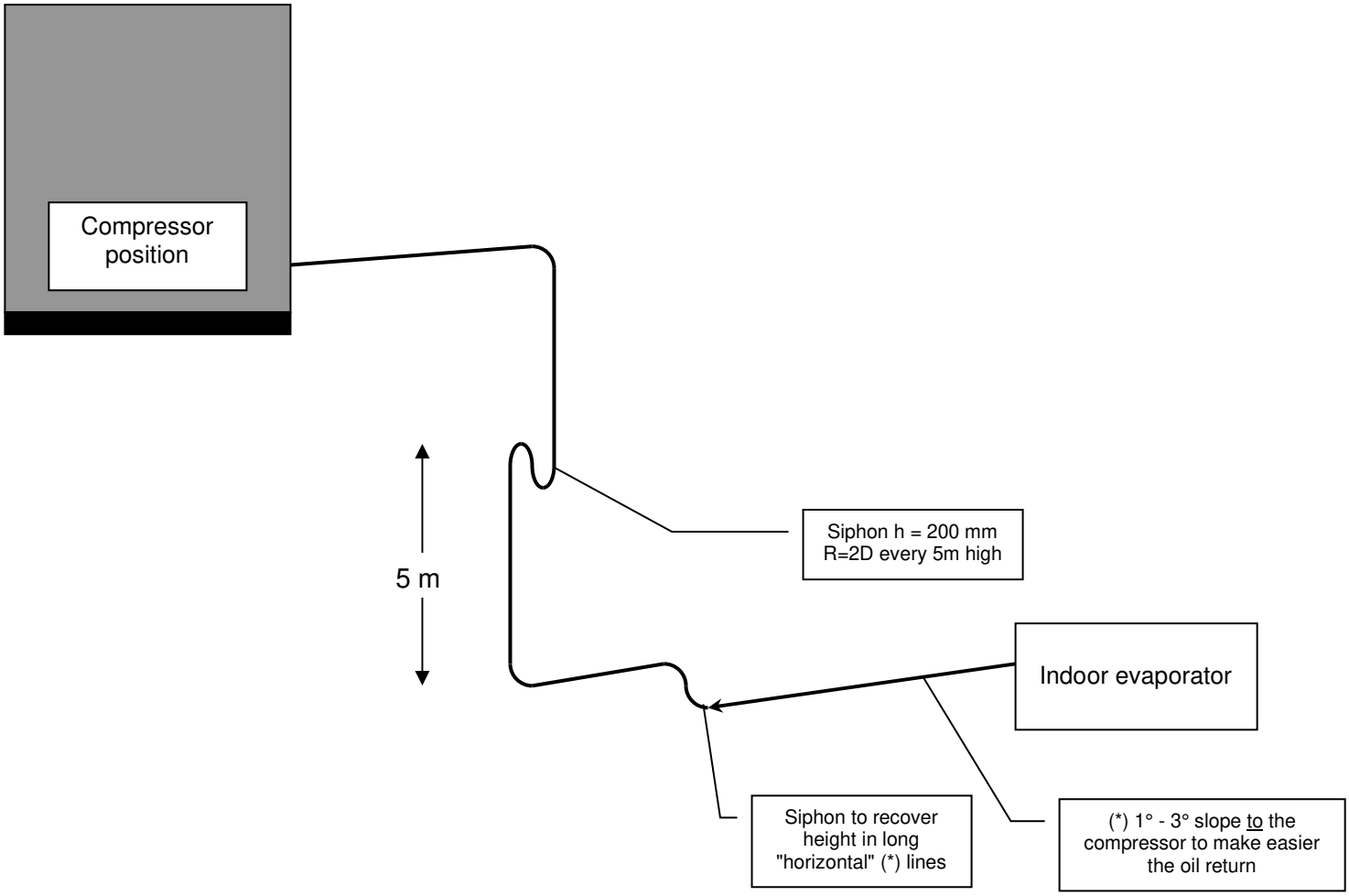
Tab.1

APPROVED OIL	
Copeland Scroll Compressors	ICI Emkarate RL 32 3MAF
Danfoss Maneurop Scroll Compressors	Oil Maneurop 160SZ 32 cSt Polyolester Oil
Panasonic Scroll Compressors	FV68S
LG Scroll Compressors	FVC68D
BLDC Mitsubishi Siam Scroll Compressors	FV50S

Installation of the suction line (Evaporator above condenser / compressor)

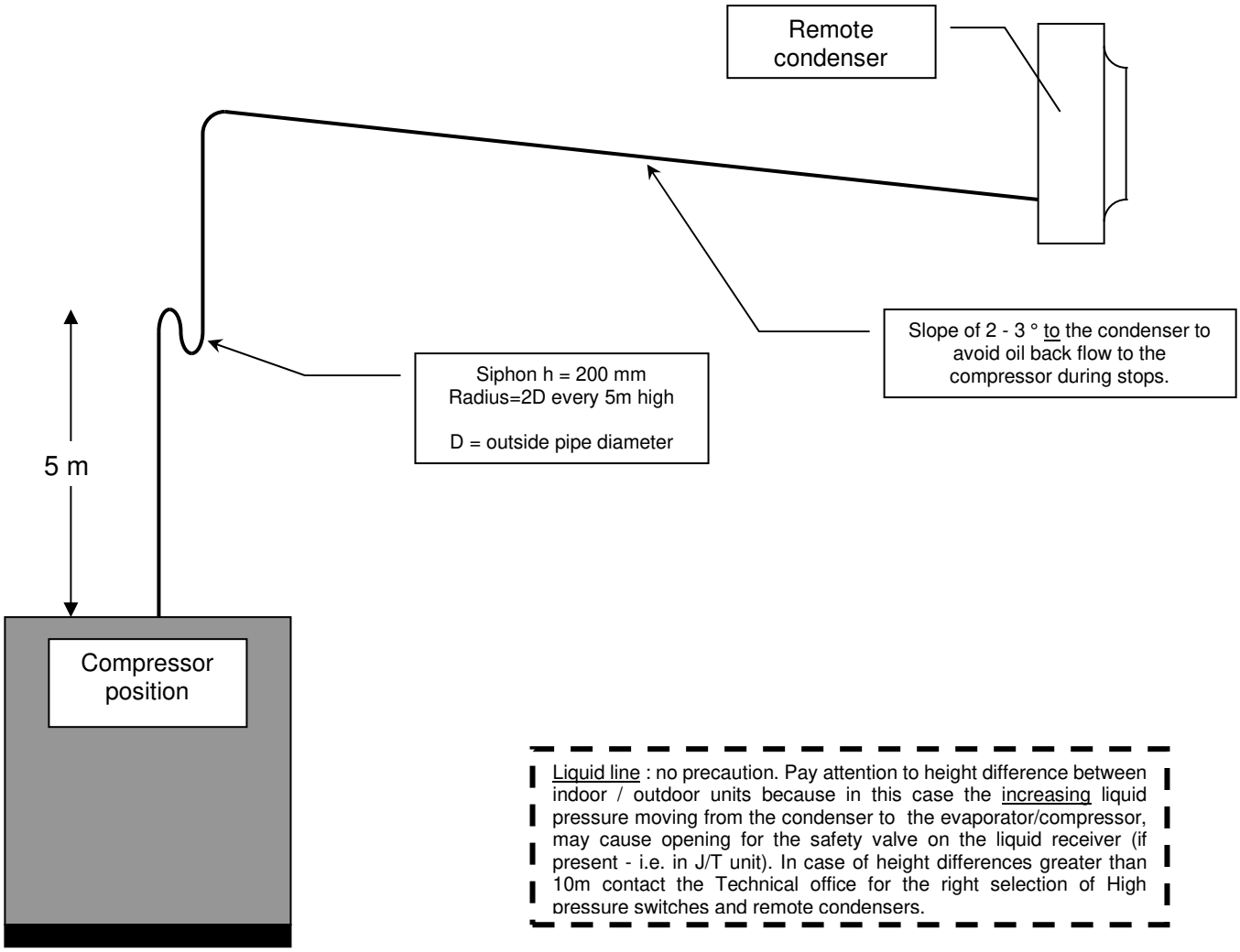


Installation of the suction line (Evaporator below condenser / compressor)



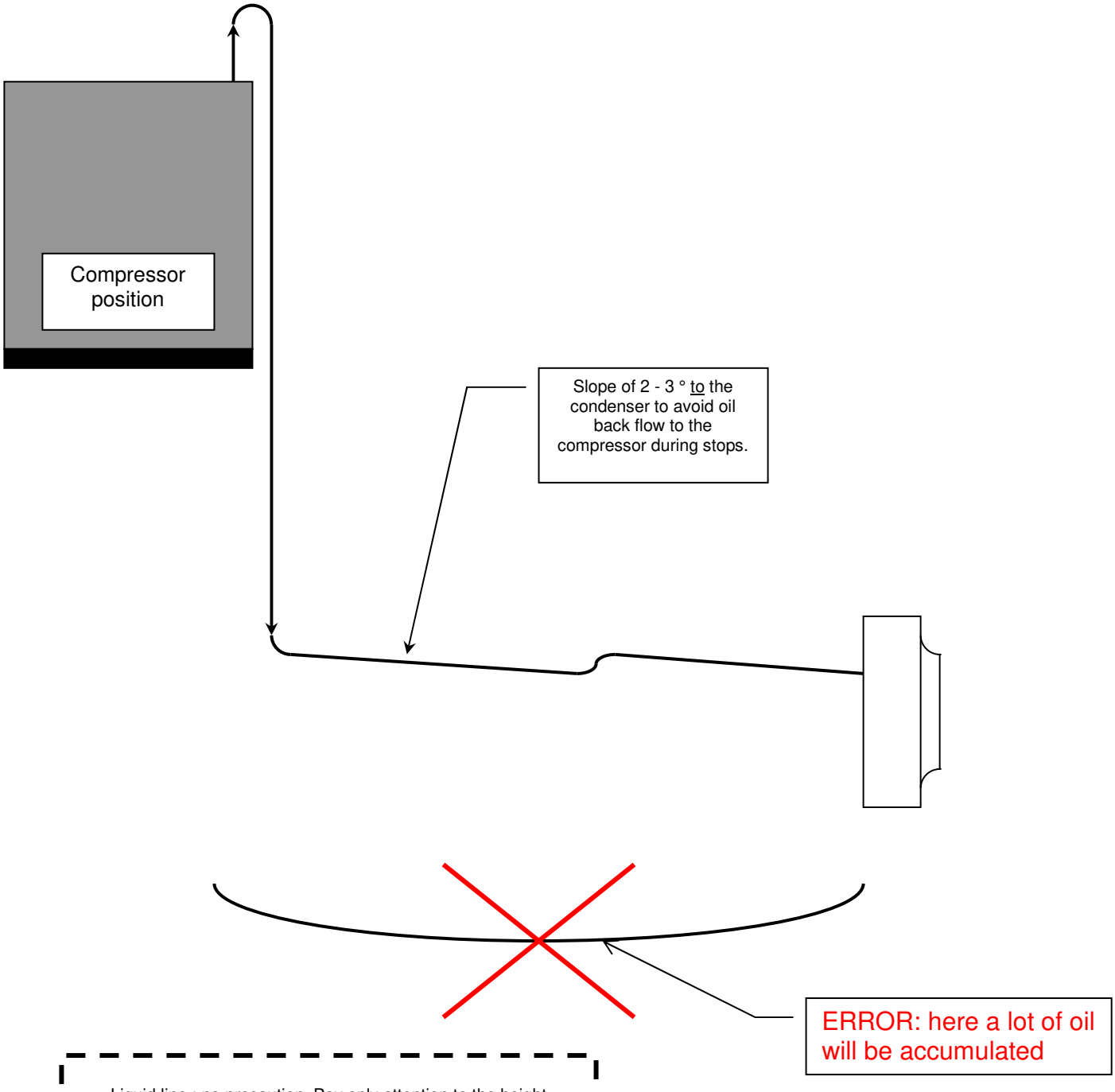
Liquid line : no precaution. Pay attention to height difference between indoor / outdoor units because in this case the increasing liquid pressure moving from the condenser to the evaporator/compressor, may cause opening for the safety valve on the liquid receiver (if present).
Max height difference 10mt

Installation of the discharge line (Condenser above evaporator / compressor)



Liquid line : no precaution. Pay attention to height difference between indoor / outdoor units because in this case the increasing liquid pressure moving from the condenser to the evaporator/compressor, may cause opening for the safety valve on the liquid receiver (if present - i.e. in J/T unit). In case of height differences greater than 10m contact the Technical office for the right selection of High pressure switches and remote condensers.

Installation of the discharge line (Condenser below evaporator / compressor)



Liquid line : no precaution. Pay only attention to the height difference between indoor / outdoor units because in this case the decreasing liquid pressure, moving from the condenser to the evaporator/compressor, may cause flash vapour on the liquid receiver. To avoid this, make sure to have at least 2°C of real subcooling, measured at the condenser outlet every 10m of increasing height.

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