Air Conditioners

Technical Data

VRV

Air-cooled selection procedure

EEDEN13-200_1

DAIKIN

Air Conditioners

Technical Data

VRV

Air-cooled selection procedure

EEDEN13-200_1

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1 Selection procedure in cooling mode

1 - 1 Flowchart

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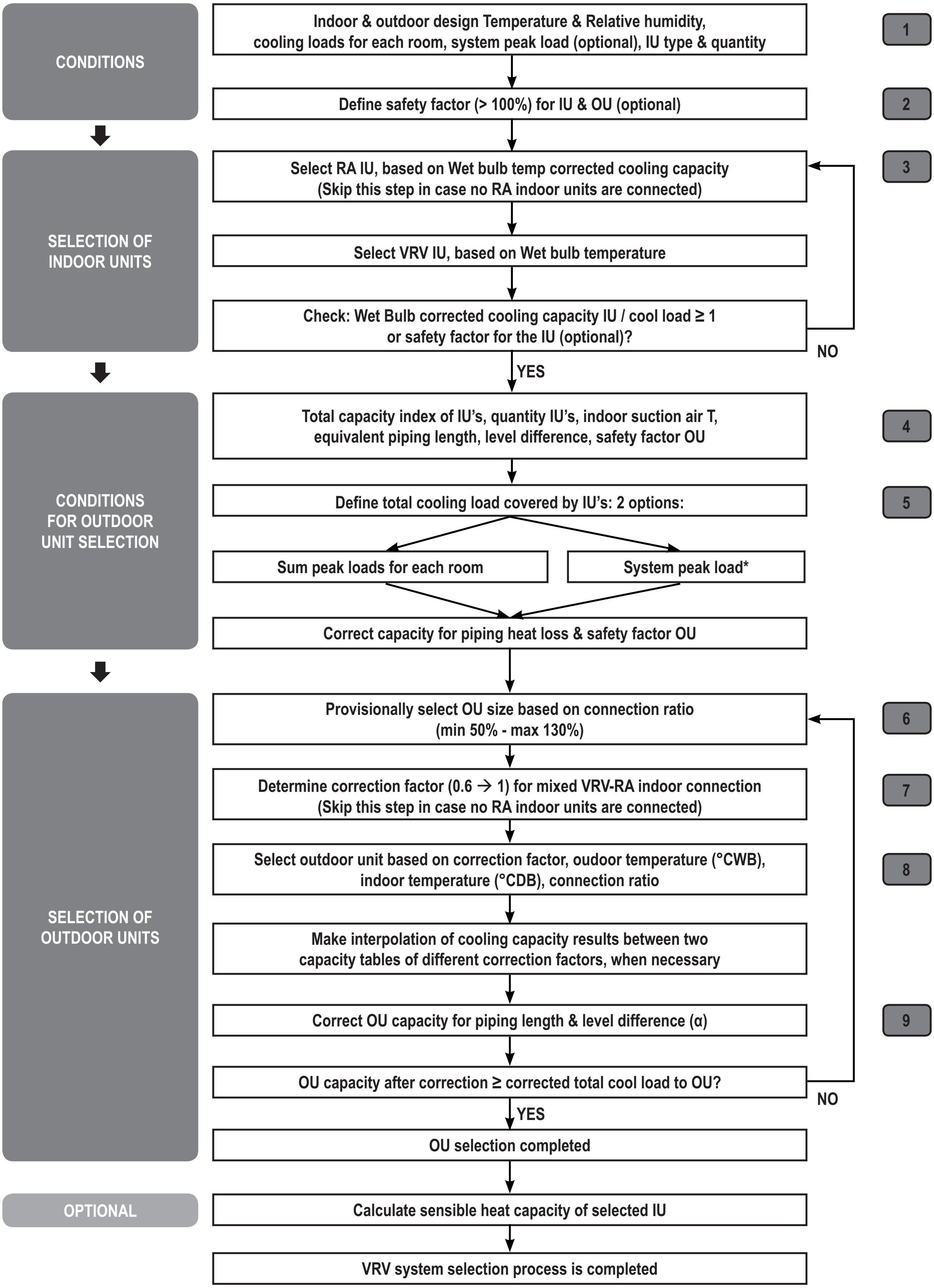


* System peak load = maximum load which has to be covered at the same time by all indoor units which are connected to the same outdoor unit

1 Selection procedure in cooling mode

1 - 2 Step by step

1 - 2 - 1 Design conditions:

To start designing a VRV system in cooling mode, following information is needed:

- Indoor conditions: Wet bulb temperature (°CWB) & Dry bulb temperature (°CDB)
- Cooling loads per room: total cooling load, sensible cooling load (optional)
- Outdoor conditions: Dry bulb temperature (°CDB)
- System peak load: the maximum total cooling load that occurs at a certain moment of the day that has to be covered by all indoor units connected to a same outdoor unit system

  System peak load Þ sum of peak loads

  Sum of peak loads = the sum of all individual peak loads of every indoor unit/room at its own peak of the day. Depending on the sun positioning and the orientation of the room. A room oriented to the east probably has its peak load in the morning, while a room oriented at the west has its peak load in the afternoon.

1 - 2 - 2 Safety factor:

Optionally it is possible to increase the calculated cooling loads by a certain factor (>1) to have extra safety when selecting indoor unit size & outdoor unit size

1 - 2 - 3 Selection of indoor unit

Select indoor unit based on total cooling load at design indoor wet bulb temperature (°CWB) & nominal outdoor dry bulb temperature (35°CDB)

1 - 2 - 3 - 1 RA indoor unit (only in case RA units are connected)

To know the cooling/heating capacity an RA indoor unit has when combined in a VRV system, check the table below:

		Indoor °CWB						
	Class	14	16	18	19	20	22	24
Cooling	20	1,16	1,42	1,8	2	2,16	2,3	2,44
	25	1,45	1,775	2,25	2,5	2,7	2,875	3,05
	35	2,03	2,485	3,15	3,5	3,78	4,025	4,27
	42	2,436	2,982	3,78	4,2	4,536	4,83	5,124
	50	2,9	3,55	4,5	5	5,4	5,75	6,1
	60	3,48	4,26	5,4	6	6,48	6,9	7,32
	71	4,118	5,041	6,39	7,1	7,668	8,165	8,662
		Indoor °CDB						
	Class	16	18	19	20	22	24	
Heating	20	2,64	2,64	2,52	2,44	2,32	2,12	
	25	3,3	3,3	3,15	3,05	2,9	2,65	
	35	4,62	4,62	4,41	4,27	4,06	3,71	
	42	5,544	5,544	5,292	5,124	4,872	4,452	
	50	6,6	6,6	6,3	6,1	5,8	5,3	
	60	7,92	7,92	7,56	7,32	6,96	6,36	
	71	9,372	9,372	8,946	8,662	8,236	7,526	

1 - 2 - 3 - 2 Correction factor for VRV indoor units (only in case RA indoor units are connected)

Select VRV indoor unit from standard cooling capacity table and multiply with the capacity correction factor for Te = 9°C, which can be found in the indoor unit chapter.

1 - 2 - 4 Check cooling load

Check if the cooling capacity of the indoor unit is bigger than the cooling load.

1 - 2 - 5 Conditions for outdoor unit selection:

Following data is needed to select correct outdoor unit system:

- Total capacity index[1] of indoor units (= sum of capacity indexes of all indoor units)
- Total number of connected indoor units
- Indoor suction air temperature (°CWB/°CDB) & design outdoor temperature (°CDB)
- Equivalent piping length between furthest indoor unit and outdoor unit
- Level difference between indoor units & outdoor unit

NOTE

1 capacity index = capacity class of RA indoor unit

1 Selection procedure in cooling mode

1 - 2 Step by step

1 - 2 - 6 Define cooling capacity to be given by outdoor unit system:

Step 1: Define Total cooling load to be absorbed by connected indoor units: two options:

- Sum of peak loads for each room
- System peak load

Step 2: Correct total cooling load indoor units by piping heat loss factor & (optional) safety factor outdoor unit

Cooling capacity to be given by outdoor unit system = total cooling load x (1 + heat loss factor x actual pipe run) x safety factor

Heat loss factor is function of design outdoor temperature (see below table)

Design outdoor temperature (°CDB)	Piping heat loss factor (%/m)
< 10	0%
15	0.004%
20	0.009%
25	0.014%
30	0.022%
35	0.030%
40	0.038%

NOTE

The table above for the cooling correction factors consist of limitation temperatures. If the ambient temperatures are outside the range in the table, the closest temperature needs to be considered.

1 - 2 - 7 Selection of outdoor unit

Provisionally select an outdoor unit, based on the Indoor design temperature (°CWB), outdoor temperature (°CDB) and connection ratio (between 50% - 130%). See cooling capacity table of selected outdoor unit in ED.

1 - 2 - 8 Determine the weight coefficient for mixed connection (only in case RA indoor units are connected)

To be able to determine the correct outdoor unit capacity first the weight coëfficient (Ce) needs to be calculated by the following formula:

$$C_e = \frac{\Sigma(\text{VRV DX Indoor unit capacity index} * C_t) + \Sigma(\text{RA DX indoor unit capacity index})}{\Sigma(\text{VRV DX indoor unit capacity index}) + \Sigma(\text{RA DX indoor unit capacity index})}$$

$0,85 < C_e < 1$

C_t = capacity correction factor for VRV indoor units when operating at T_e = 9°

1 - 2 - 9 Determine the outdoor unit capacity table to be used

For every outdoor unit 4 different capacity tables are given:

- Capacity table at C_e = 1
- Capacity table at C_e = 0.95
- Capacity table at C_e = 0.90
- Capacity table at C_e = 0.85

The exact outdoor unit capacity with a certain correction factor for mixed connection can be calculated by interpolating between the different weigth coefficients.

1 Selection procedure in cooling mode

1 - 2 Step by step

1 - 2 - 10 Correct outdoor unit capacity for piping losses

- Check if maximum number of indoor units and connection ratio is within limiations
- Capacity of the outdoor unit needs to be corrected for losses of the refrigerant piping length & height difference between indoor and outdoor unit.
  - ➔ See capacity correction ratio graph in ED
- Check if the available capacity is still bigger than the cooling capacity to be given by the outdoor system
- Outdoor unit size is selected.

NOTE

In the VRV selection software, the heat loss correction factor is applied to the outdoor unit and not to the requested capacity. This is because the requested capacity is known by the user and is needed to be filled in. It would be strange to see another figures being used in the calculations than the one put in in the system.

Calculation of LT hydrobox:

LT hydrobox is considered as a VRV indoor to calculate required cooling capacity. Refer to ED for more info on connectable VRV outdoor units and which indoor units can be combined in the same system.

1 - 2 - 11 Sensible heat capacity

Sensible capacity is the capacity required to lower the temperature and latent capacity is the capacity to remove the moisture from the air. The sensible heat can influence selection in case of really humid area's (gym), or dry room (computer rooms).

When sensible capacity is larger than normal, bigger IU need to be selected to be able to reach the full required capacity.

1 Selection procedure in cooling mode

1 - 3 Example

1 - 3 - 1 Design conditions

- Determine indoor / outdoor design temperature

  Indoor: 20°CWB / 28°CDB

  Ambient: 33°CDB

- Determine room peak loads (and if possible, system peak loads = optional)

1

Design loads in kW (total cooling capacity)

Time	A	B	C	D	E	F	G	H	Sum
9h00	*2.9*	2	1.5	3.3	3	*4*	3	1.7	21.4 kW
13h00	2	*2.7*	1	3.3	*4*	3.4	*3.9*	1.9	22.2 kW
17h00	1.9	1.8	*2.5*	*4.3*	3.3	3	2.3	*2.9*	22 kW

Sum Room Peak loads 27.2 kW

System Peak Load 22.2 kW — Max capacity requested from outdoor unit

1 - 3 - 2 Safety factor

In this example, safety factor is not used.

1 - 3 - 3 Selection of indoor unit

FXCQ indoor unit

	A	B	C	D	E	F	G	H	**Sum**
FXCQ				**50**	**50**	**50**	**50**		**330**
FTXG	**35**	**35**	**25**					**35**	
kW	**3.6**	**3.6**	**2.5**	**4.8**	**4.8**	**4.8**	**4.8**	**3.6**	**32.3**

* the capacity is selected according to the design conditions (indoor 20°CWB / 28°CDB; ambient 35°CDB)

NOTE

The new selection method, for the indoor unit selection, does not take into account the outdoor temperature. Therefore take the rated outdoor temperatures when looking up in the indoor unit capacity table (35°CDB for cooling, 7°CDB for heating)

1 - 3 - 3 - 1 RA indoor unit (only in case RA indoor units are connected)

		Indoor °CWB						
	Class	14	16	18	19	20	22	24
Cooling	20	1,16	1,42	1,8	2	2,16	2,3	2,44
	25	1,45	1,775	2,25	2,5	2,7	2,875	3,05
	35	2,03	2,485	3,15	3,5	3,78	4,025	4,27
	42	2,436	2,982	3,78	4,2	4,536	4,83	5,124
	50	2,9	3,55	4,5	5	5,4	5,75	6,1
	60	3,48	4,26	5,4	6	6,48	6,9	7,32
	71	4,118	5,041	6,39	7,1	7,668	8,165	8,662
		Indoor °CDB						
	Class	16	18	19	20	22	24	
Heating	20	2,64	2,64	2,52	2,44	2,32	2,12	
	25	3,3	3,3	3,15	3,05	2,9	2,65	
	35	4,62	4,62	4,41	4,27	4,06	3,71	
	42	5,544	5,544	5,292	5,124	4,872	4,452	
	50	6,6	6,6	6,3	6,1	5,8	5,3	
	60	7,92	7,92	7,56	7,32	6,96	6,36	
	71	9,372	9,372	8,946	8,662	8,236	7,526	

To be able to connect the RA indoor units to the VRV outdoor unit, a BPMK box should be added.

2 types exist, the BPMKS967B2B to connect to 2 RA indoors, and the BPMKS967B3B to connect to 3 RA indoors.

In this example, for the first 3 units (35 +35 +25) a BPMKS967B**3**B will be used and for the last 35 class, a BPMKS967B**2**B is used.

1 Selection procedure in cooling mode

1 - 3 Example

1 - 3 - 3 Selection of indoor unit

1 - 3 - 3 - 2 Additional steps for VRV indoor selection when mixed with RA indoor units (only in case RA indoor units are connected)

Capacity correction factor (Te=9°C) = 0.795

FXCQ50 TC = 6.0

TC (at Te =9C) = 6.0 x 0.795 = 4.77

FXCQ

		Te=9°C						
	Indoor air temperature	14.0 °CWB 20.0 °CDB	16.0 °CWB 23.0 °CDB	18.0 °CWB 26.0 °CDB	19.0 °CWB 27.0 °CDB	20.0 °CWB 28.0 °CDB	22.0 °CWB 30.0 °CDB	24.0 °CWB 32.0 °CDB
FXCQ20	TC	0.667	0.697	0.748	0.767	0.788	0.817	0.844
	SHF	1.172	1.184	1.130	1.106	1.084	1.061	1.039
FXCQ25	TC	0.681	0.690	0.741	0.766	0.787	0.817	0.842
	SHF	1.147	1.192	1.135	1.108	1.086	1.061	1.041
FXCQ32	TC	0.681	0.690	0.741	0.766	0.787	0.817	0.842
	SHF	1.147	1.192	1.135	1.108	1.086	1.061	1.041
FXCQ40	TC	0.671	0.687	0.748	0.772	0.792	0.821	0.854
	SHF	1.167	1.191	1.128	1.101	1.082	1.059	1.035
FXCQ50	TC	0.663	0.690	0.753	0.777	0.795	0.831	0.857
	SHF	1.177	1.185	1.123	1.097	1.081	1.054	1.034
FXCQ63	TC	0.682	0.692	0.740	0.763	0.784	0.815	0.840
	SHF	1.144	1.191	1.138	1.111	1.088	1.061	1.042
FXCQ80	TC	0.707	0.689	0.752	0.776	0.795	0.830	0.856
	SHF	1.166	1.187	1.124	1.098	1.080	1.055	1.035
FXCQ125	TC	0.683	0.691	0.753	0.776	0.796	0.831	0.855
	SHF	1.132	1.180	1.121	1.096	1.077	1.054	1.043

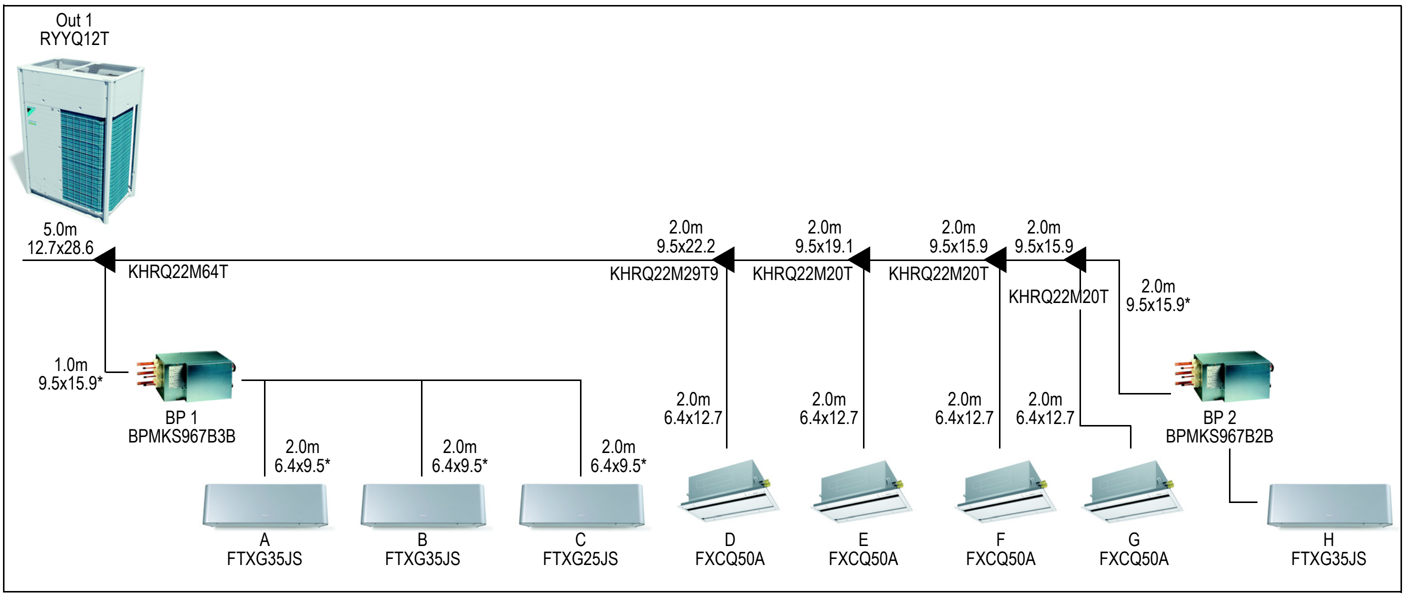
1 - 3 - 4 Check cooling load

Total cooling capacity of indoors > cooling load

32.3>22.2 kW

1 - 3 - 5 Conditions for outdoor unit selection:

- Total capacity index of indoor units = 330 OK
- Number of Selected indoors = 8 OK
- Equivalent piping length and level difference



Equivalent pipe length (*) = 19.5 meter

(*) Length to furthest indoor unit including equiv. pipe length of refnets (0.5 meter per refnet)

Example above in case VRV & RA indoors are mixed. Only some outdoor units allow connection of RA indoor!

1 Selection procedure in cooling mode

1 - 3 Example

1 - 3 - 6 Define cooling capacity to be given by outdoor unit system:

1

Total cooling load

- Sum of peak loads = 27.2 kW
- System peak load = 22.2 kW

Correct total cooling load

Table: Coefficient of loss per meter of piping with insulation thickness of 10mm

Correction factor	HLC (%/m)	HLH (%/m)
Ambient temperature	Cooling	Heating
-15		0.100
-10		0.093
-5		0.086
0		0.078
5	0.000	0.071
10	0.000	0.064
15	0.004	0.057
20	0.009	0.049
25	0.014	
30	0.022	
35	0.030	
40	0.038	

For 33°CDB ambient temperature, the heat loss factor is 0.0268% (interpolated).

For the piping length, the first 7.5m is not considered

⇨ 19.5m - 7.5m = 12m

Heat loss factor * actual piping run

⇨ 0.0268% * 12m = 0.003216

total cooling load x (1 + (heat loss factor x actual pipe run))

⇨ 22.2*(1 + 0.003216) = 22.3

1 Selection procedure in cooling mode

1 - 3 Example

1 - 3 - 7 Selection of outdoor unit

- select outdoor unit type

  RYYQ12T outdoor unit

Determine max. allowed connection ratio (refer to specs)

Outdoor unit	Indoor unit combination ratio								
	130 %	120 %	110 %	100 %	90 %	80 %	70%	60 %	50 %
12HP	390	360	330	300	270	240	210	180	150

1 - 3 - 8 Determine the weight coefficient for mixed connection (only in case RA indoor units are connected)

Total of VRV indoor unit capacity index = 200

Total of RA indoor unit capacity index = 130

Correction factor for Te 9°C = 0.795

$$\text{weight coefficient } (C_e) = \frac{(200 \times 0.795) \times 1.12 + 130}{(200 + 130)} = 0.9336$$

1 - 3 - 9 Select correct outdoor unit capacity table and determine capacity (only in case RA indoor units are connected)

Connection ratio = 330/300 = 110%

Interporate between weigth coefficients:

0.95

0.90

Interporate between the different correction factors

31.4 + (35.1 – 31.4) x (0.8794 – 0.8)/(0.9-0.8) = 34.34

The calculated capacity of the assumed outdoor unit is 34.34kW.

1 Selection procedure in cooling mode

1 - 3 Example

1 - 3 - 10 Correct outdoor unit capacity for piping losses

At 33°CDB ambient, 20°CWB/28°CDB indoor, the cooling capacity outdoor = 34.34 kW

In the capacity the outdoor unit can deliver following losses have to be incorporated:

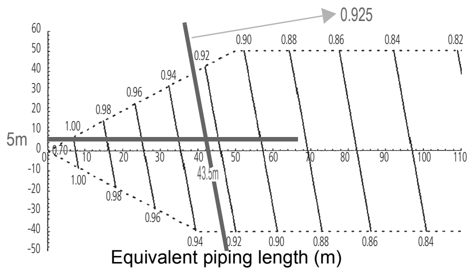
1 pipe length / level difference correction factor for given equiv. pipe length (19.5m) and level difference (5 m) = 0.925

2 losses due to defrost = not applicable (since cooling mode)

=> 34.34 kW * 0.925 = 31.76 kW

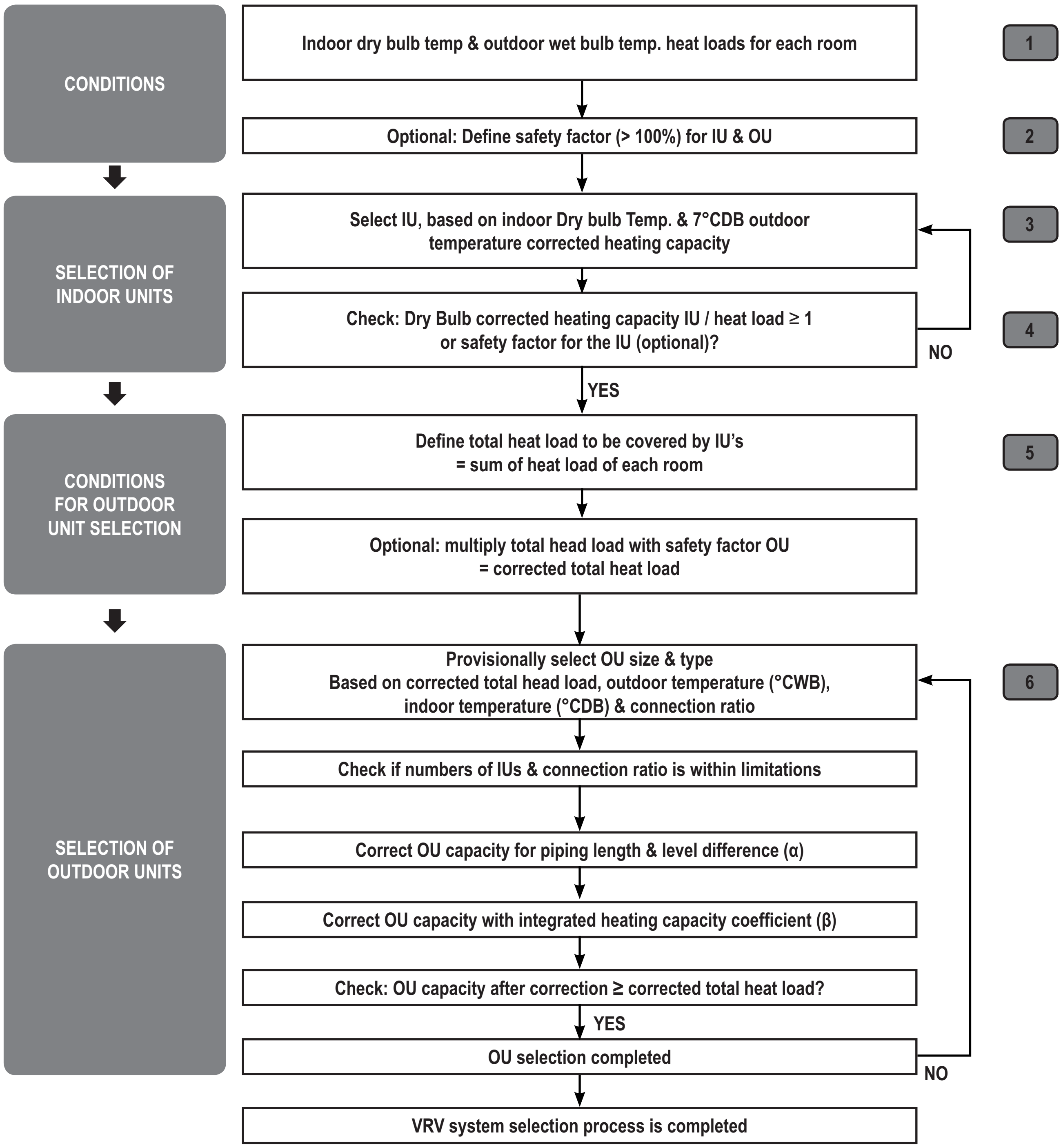
The outdoor unit gives 31.76 kW whereas the required capacity is 22.4 kW

1



2 Selection procedure in heating mode

2 - 1 Flowchart



2 Selection procedure in heating mode

2 - 2 Step by step

2 - 2 - 1 Design conditions:

To start designing a VRV system in heating mode, following information is needed:

- Indoor conditions: Dry bulb temperature (°CDB)
- Heat loads per room: total heat load
- Outdoor conditions: Wet bulb temperature (°CWB) & Dry bulb temperature (°CDB)

2

2 - 2 - 2 Safety factor:

Optionally it is possible to increase the calculated heat loads by a certain factor (>1) to have extra safety when selecting indoor unit size & outdoor unit size

2 - 2 - 3 Selection of indoor unit

Select indoor unit based on total heat load at design indoor dry bulb temperature(°CDB) & nominal outdoor temperature (6°CWB / 7°CDB)

➔ See heating capacity table of selected type of indoor unit

2 - 2 - 4 Check heat load

If a safety factor has been applied to the heat load, please check if the heating capacity of the indoor unit is bigger than the corrected heat load.

2 - 2 - 5 Conditions for outdoor unit selection:

Following data is needed to select correct outdoor unit system:

- Total capacity index of indoor units (= sum of capacity indexes of all indoor units)
- Total number of connected indoor units
- Indoor suction air temperature (°CDB) & design outdoor temperature (°CWB)
- Equivalent piping length between furthest indoor unit and outdoor unit
- Level difference between indoor units & outdoor unit
- Safety factor for outdoor unit (optional)

2 - 2 - 6 Define heating capacity to be given by outdoor unit system:

The total heating capacity to be given by outdoor unit system is defined by the sum of all heating loads to be absorbed by the indoor units connected to the to be selected outdoor unit

2 Selection procedure in heating mode

2 - 2 Step by step

2 - 2 - 7 Selection of outdoor unit

- Provisionally select outdoor unit size & type based on outdoor temperature (°CDB), indoor temperature (°CDB) & connection ratio
  - ➔ See heating capacity table of selected outdoor unit in ED
- Check if maximum number of indoor units and connection ratio is within limitations
- Correct the outdoor unit capacity by piping correction factor (a) based on pipe run and level difference between indoor unit and outdoor unit
  - ➔ See piping correction diagrams in ED
- Correct the outdoor unit capacity by integrated heating capacity coefficient (b) influence of the defrost operation on the integrated heating capacity)
- ➔ See integrated heating capacity table in ED
- Check if available heating capacity after piping & defrost correction is still bigger than the heating capacity to be given by the outdoor unit
- Outdoor unit size is selected.

REMARK

Calculation of HT Hydrobox:

- Available heating capacity HXHD125 = 14 kW
  - ➔ this remains always available irrespective of outdoor temperature or leaving water temperature (LWT)
- Capacity index HXHD125 = 125
  - ➔ to be used for definition of total capacity index & connection ratio of REYAQ
- Power input HXHD125 depends on Leaving Water Temperature (LWT) (see table 1)
- Requested heating capacity from REYAQ depends on Leaving Water (LWT) (see table 1)

Table 1:

Leaving Water Temperature [°C]	35	45	55	65	75
Requested heating capacity from REYAQ [kW]	12.98	12.60	12.60	12.10	11.09
Power input HXHD125 [kW]	1.50	1.79	1.83	2.33	3.25

In case less than 14 kW capacity is needed to produce hot water:

When less than 14 kW heating capacity is required from the hydrobox, the values of requested outdoor capacity and power consumption are adjusted proportionally.

Only connectable to REYAQ outdoor units. Refer to ED which indoor units can be combined in the same system.

Calculation of LT hydrobox: LT hydrobox is considered as a VRV indoor to calculate required heating capacity. Refer to ED for more info on connectable outdoor units and which indoor units can be combined in the same system.

Calculation of Biddle air curtain: Biddle air curtain is considered as a VRV indoor to calculate required heating capacity. Refer to ED for more info on how to select the correct air curtain, connectable outdoor units and which indoor units can be combined in the same system.

2 Selection procedure in heating mode

2 - 3 Example

2 - 3 - 1 Design conditions

- Determine indoor / outdoor design temperature

  Indoor: 18° CDB

  Ambient: 2.2° CWB / 3° CDB

- Determine room peak loads (and if possible, system peak loads = optional)

2

Design loads in kW (total heating capacity)

Time	A	B	C	D	E	F	G	H	Sum
9h00	*3.1*	2.3	1.9	3.8	3.2	*4.1*	3.5	2	23.9 kW
13h00	2.8	*2.9*	1.5	3.7	*4.1*	3.7	*4*	2.2	24.9 kW
17h00	2.2	2	*2.7*	*4.5*	3.6	3.3	2.7	*3.2*	24.2 kW

Sum Room Peak loads 28.6 kW

System Peak Load 24.9 kW

2 - 3 - 2 Safety factor

In this example, safety factor does not use.

2 - 3 - 3 Selection of indoor unit

FXCQ indoor unit

	A	B	C	D	E	F	G	H	**Sum**
FXCQ	**25**	**25**	**25**	**40**	**40**	**40**	**40**	**25**	**260**
kW	**3.4**	**3.4**	**3.4**	**5.2**	**5.2**	**5.2**	**5.2**	**3.4**	**34.4**

* the capacity is selected according to the design conditions (indoor 18° CDB; ambient 6° CWB / 7° CDB)

NOTE

The new selection method, for the indoor unit selection, does not take into account the outdoor temperature. Therefore take the rated outdoor temperatures when looking up in the indoor unit capacity table (35° CDB for cooling, 7° CDB for heating)

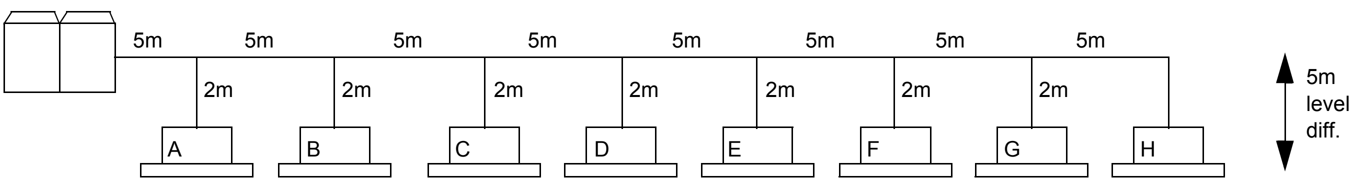
2 - 3 - 4 Check heat load

Total heating capacity of indoors > heat load

34>24.9 kW

2 - 3 - 5 Conditions for outdoor unit selection:

- Total capacity index of indoor units = 260 OK
- Number of Selected indoors = 8 OK
- Equivalent piping length and level difference



Equivalent pipe length (*) = 43.5 meter

(*) Length to furthest indoor unit including equiv. Pipe length of refnets (0.5 meter per refnet)

2 Selection procedure in heating mode

2 - 3 Example

2 - 3 - 6 Define heating capacity to be given by outdoor unit system:

Total heating load

- Sum of peak loads = 28.6 kW
- System peak load = 24.9 kW

Correct total heat load

Table: Coefficient of loss per meter of piping with insulation thickness of 10mm

Correction factor	HLC (%/m)	HLH (%/m)
Ambient temperature	Cooling	Heating
-15		0.100
-10		0.093
-5		0.086
0		0.078
5	0.000	0.071
10	0.000	0.064
15	0.004	0.057
20	0.009	0.049
25	0.014	
30	0.022	
35	0.030	
40	0.038	

For 3° CDB ambient temperature, the heat loss factor is 0.0752% (interpolated).

For the piping length, the first 7.5m is not considered

⇨ 43.5m - 7.5m = 36m

Heat loss factor * actual piping run

⇨ 0.0752% * 36m = 0.027072

total cooling load x (1 + (heat loss factor x actual pipe run))

⇨ 24.9*(1 + 0.027072) = 25.9

2 Selection procedure in heating mode

2 - 3 Example

2 - 3 - 7 Selection of outdoor unit

- select outdoor unit type
  RXYQ8 outdoor unit

Indoor unit combination total capacity index table

Outdoor unit	Indoor unit combination ratio								
	130 %	120 %	110 %	100 %	90 %	80 %	70%	60 %	50 %
4HP	130	120	110	100	90	80	70	60	50
5HP	162.5	150	137.5	125	112.5	100	87.5	75	62.5
6HP	182	168	154	140	126	112	98	84	70
8HP	260	240	220	200	180	160	140	120	100
10HP	325	300	275	250	225	200	175	150	125
12HP	390	360	330	300	270	240	210	180	150
14HP	455	420	385	350	315	280	245	210	175
16HP	520	480	440	400	360	320	280	240	200
18HP	585	540	495	450	405	360	315	270	225
20HP	650	600	550	500	450	400	350	300	250
22HP	715	660	605	550	495	440	385	330	275
24HP	780	720	660	600	540	480	420	360	300
26HP	845	780	715	650	585	520	455	390	325
28HP	910	840	770	700	630	560	490	420	350
30HP	975	900	825	750	675	600	525	450	375
32HP	1,040	960	880	800	720	640	560	480	400
34HP	1,105	1,020	935	850	765	680	595	510	425
36HP	1,170	1,080	990	900	810	720	630	540	450
38HP	1,235	1,140	1,045	950	855	760	665	570	475
40HP	1,300	1,200	1,100	1,000	900	800	700	600	500
42HP	1,365	1,260	1,155	1,050	945	840	735	630	525
44HP	1,430	1,320	1,210	1,100	990	880	770	660	550
46HP	1,495	1,380	1,265	1,150	1,035	920	805	690	575
48HP	1,560	1,440	1,320	1,200	1,080	960	840	720	600
50HP	1,625	1,500	1,375	1,250	1,125	1,000	875	750	625
52HP	1,690	1,560	1,430	1,300	1,170	1,040	910	780	650
54HP	1,755	1,620	1,485	1,350	1,215	1,080	945	810	675

- Determine max. allowed connection ratio
  Max. 130% connection ratio

At 2.2° CWB/3° CDB ambient, 18° CDB indoor, the heating capacity outdoor = 26,8 kW (cfr. Capacity table in databook)

The outdoor unit gives 26.8 kW whereas the required capacity is 25.6 kW.

2 - 3 - 8 Defrost factor

The outdoor unit gives 26.8 kW, but still a defrost factor needs to be considered.
The defrost factor for 3° CDB, is 0.83, so this factor decreases the total outdoor unit capacity.
⇨ 26.8 kW * 0.83 = 22.24 kW.

This means that the 8 HP unit is not sufficient to reach the required capacity of 25.6 kW.
Size up to 10 HP and recheck the values.
⇨ The heating capacity outdoor is 33.6 kW, and after defrost factor correction it is 27.9 kW.

3 Limitations on the number of indoor units connectable to a central controller

In case VRV outdoor units are connected to VRV indoor units, BP-boxes and RA indoor units, the communication is higher than for normal VRV systems. Therefore the number of connectable units to a central controller is limited. In table below an overview is given showing the different connection possibilities for the number of residential and VRV indoor units depending on the number of outdoor systems.

Maximum connection Q'ty (Outdoor and indoor)

Total outdoor unit Q'ty: 10	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	79	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	14	30	47	63	79	95	111	128
Total outdoor unit Q'ty	10	10	10	10	10	10	10	10	10

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 9	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	81	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	17	33	48	64	80	96	112	128
Total outdoor unit Q'ty	9	9	9	9	9	9	9	9	9

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 8	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	82	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	18	34	49	65	81	96	112	128
Total outdoor unit Q'ty	8	8	8	8	8	8	8	8	8

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 7	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	84	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	21	36	51	67	82	97	112	128
Total outdoor unit Q'ty	7	7	7	7	7	7	7	7	7

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 6	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	86	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	23	38	53	68	83	98	113	128
Total outdoor unit Q'ty	6	6	6	6	6	6	6	6	6

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 5	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	88	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	26	40	55	69	84	98	113	128
Total outdoor unit Q'ty	5	5	5	5	5	5	5	5	5

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 4	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	89	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	27	41	56	70	84	99	113	128
Total outdoor unit Q'ty	4	4	4	4	4	4	4	4	4

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 3	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	91	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	29	43	57	71	85	99	113	128
Total outdoor unit Q'ty	3	3	3	3	3	3	3	3	3

❉: BPMK Q'ty can be ignored.

Total outdoor unit Q'ty: 2	EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	Normal case
Indoor for (Sky Air + RA) ❉	93	70	60	50	40	30	20	10	0
Indoor for normal VRV	0	31	45	59	72	86	100	114	128
Total outdoor unit Q'ty	2	2	2	2	2	2	2	2	2

❉: BPMK Q'ty can be ignored.

3 Limitations on the number of indoor units connectable to a central controller

Example:

When 3 outdoor units are connected to a central controller, it is possible to connect:

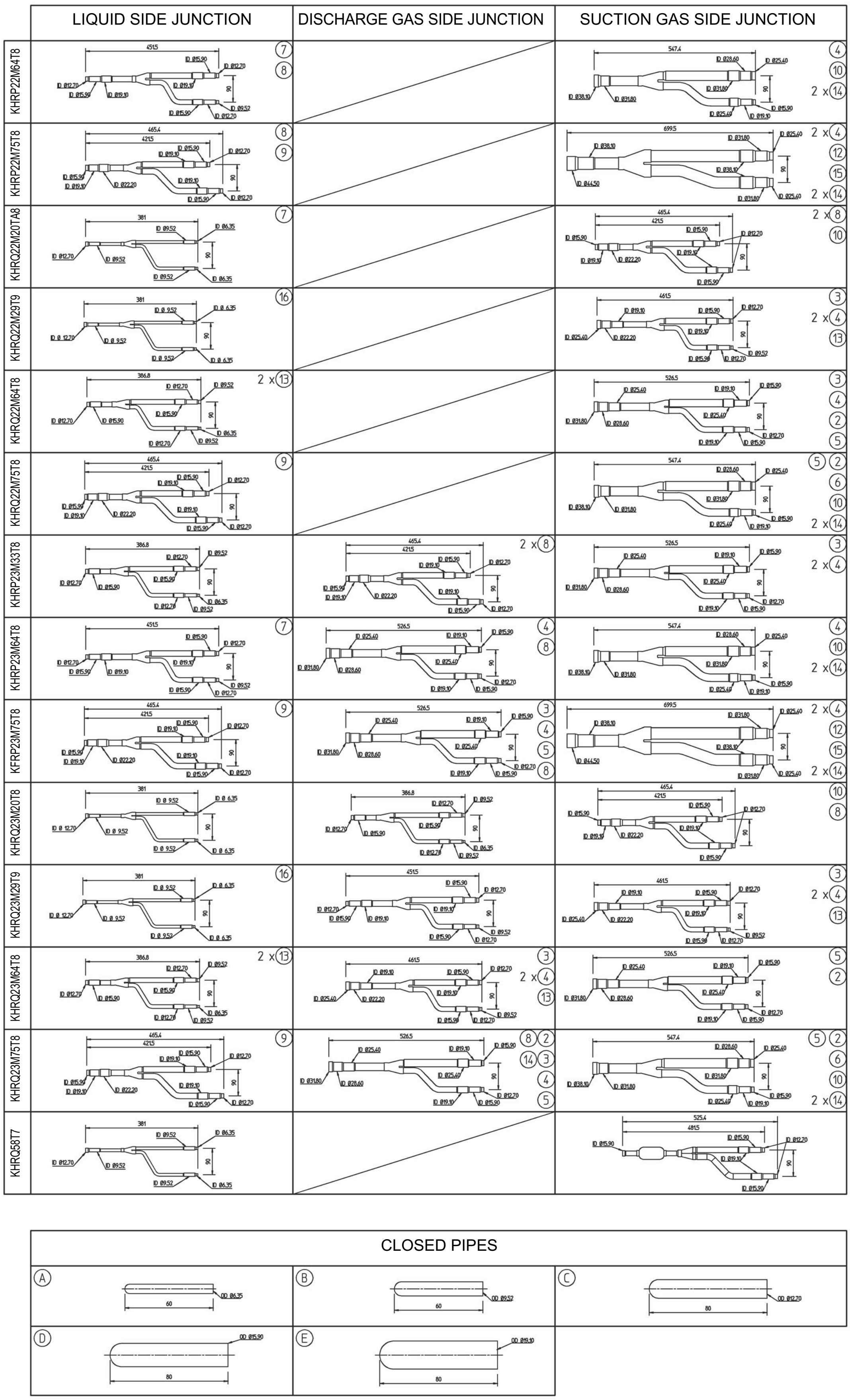
- 70 Sky Air or residential indoor units and 29 VRV indoor units
- OR 60 Sky Air or residential indoor units and 43 VRV indoor units
- OR 50 Sky Air or residential indoor units and 57 VRV indoor units
- …

3

It is possible to interpolate between the different examples, but you always have to round down. For example if you want to connect 3 outdoor units and 65 Sky Air or residential indoor units to a central controller, you can connect 36 VRV indoor units (29 + (70-65)/(70-60) x (43 - 29) = 36).

4 Refnet pipe systems

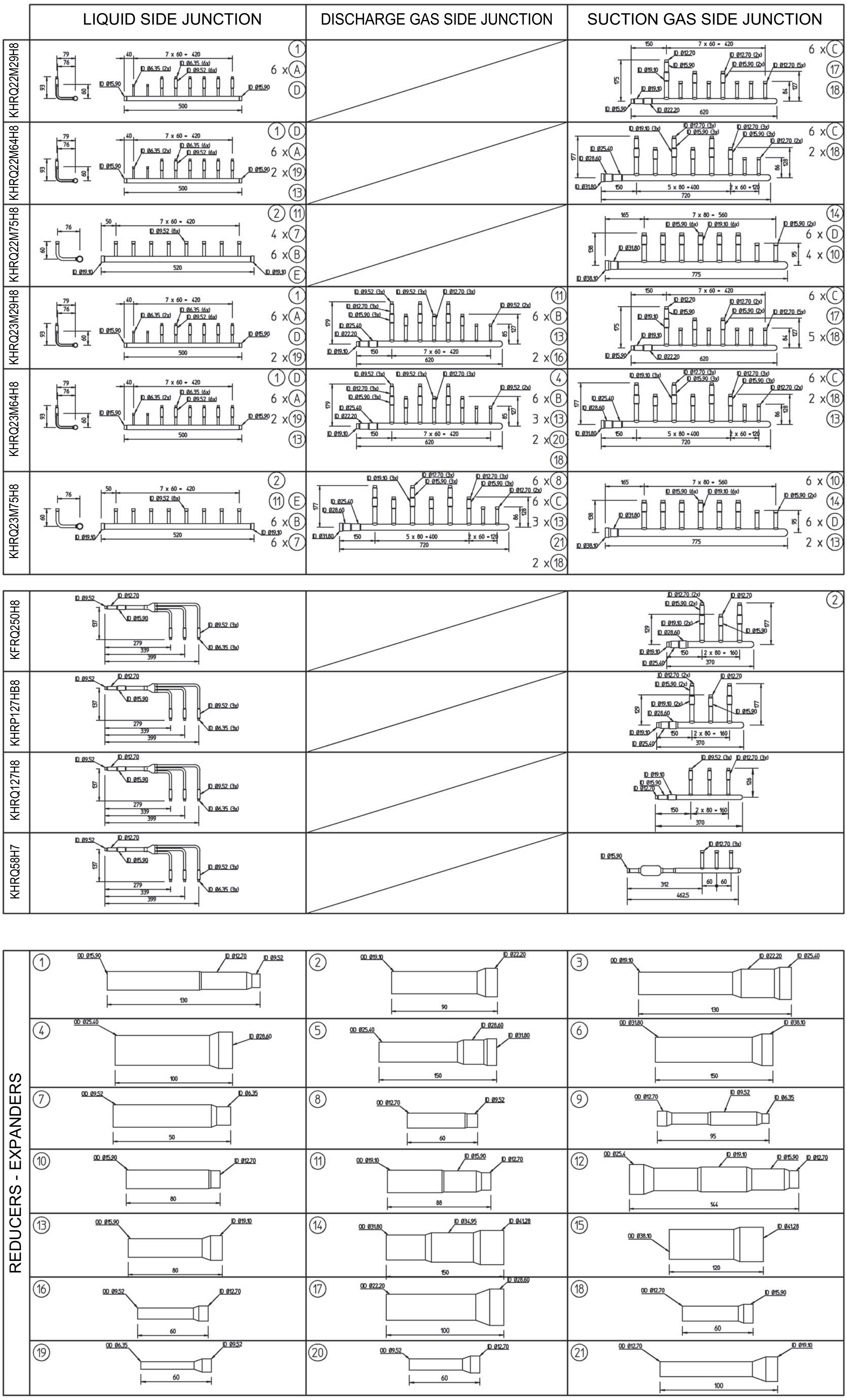
4 - 1 Refnet pipe systems



1TW25799-4D

4 Refnet pipe systems

4 - 1 Refnet pipe systems



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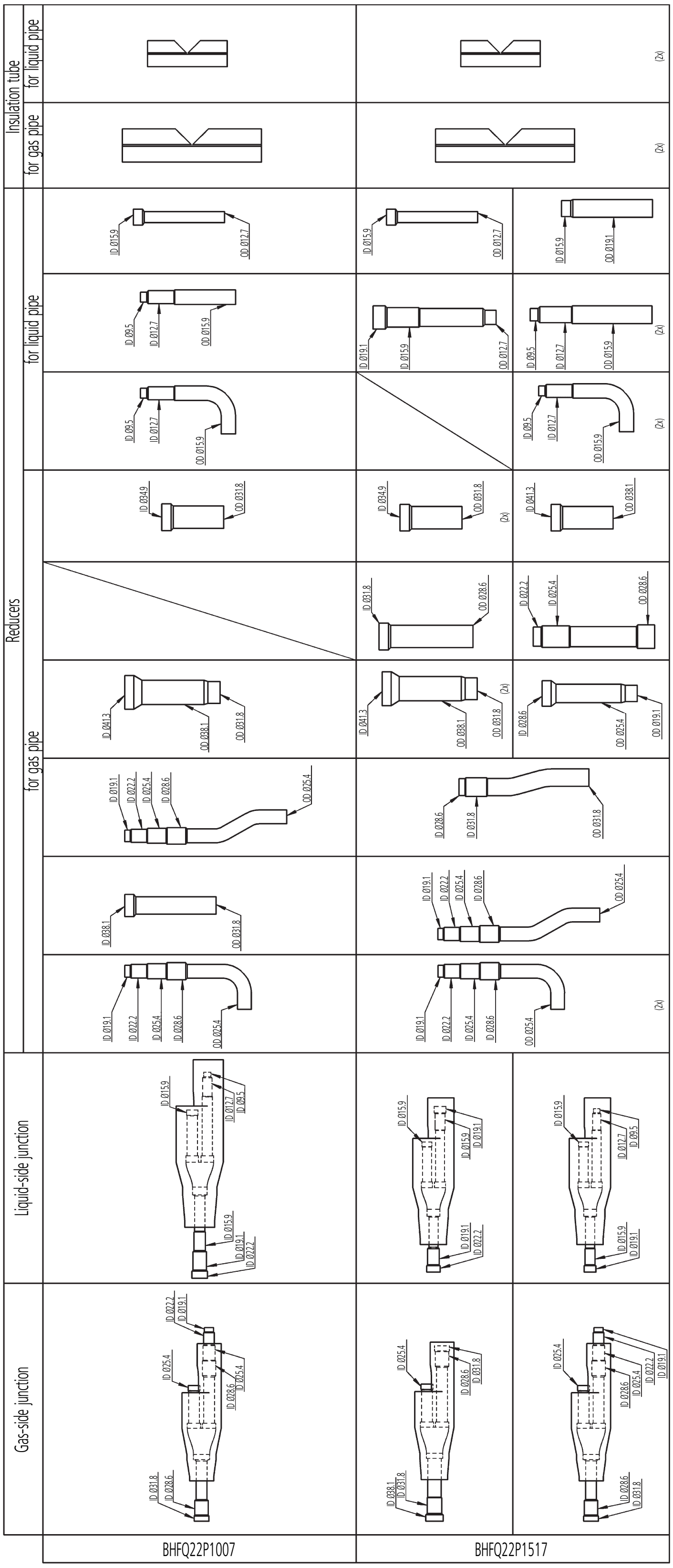
4 Refnet pipe systems

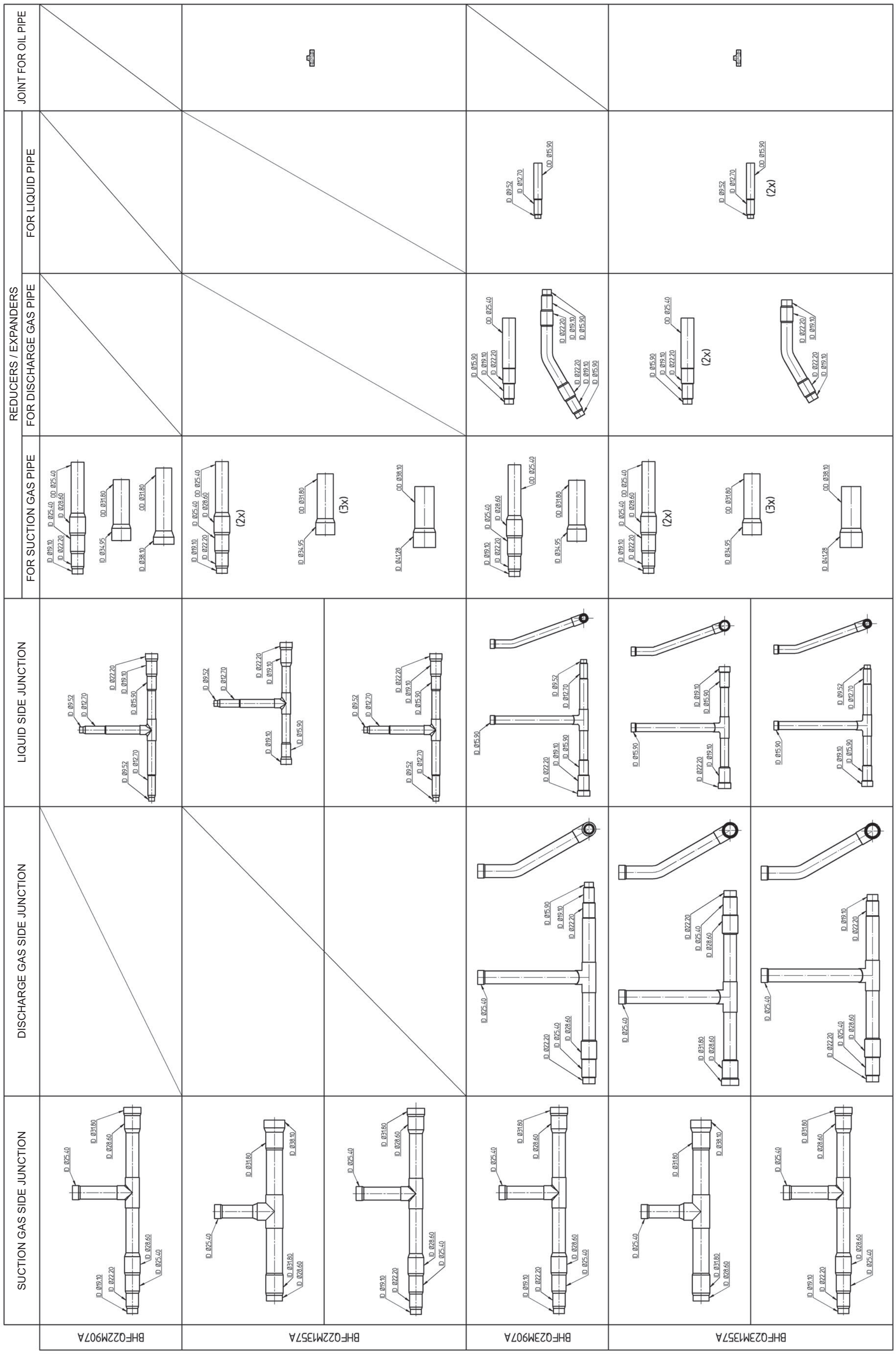
4 - 1 Refnet pipe systems



2TW27239-1

4 Refnet pipe systems

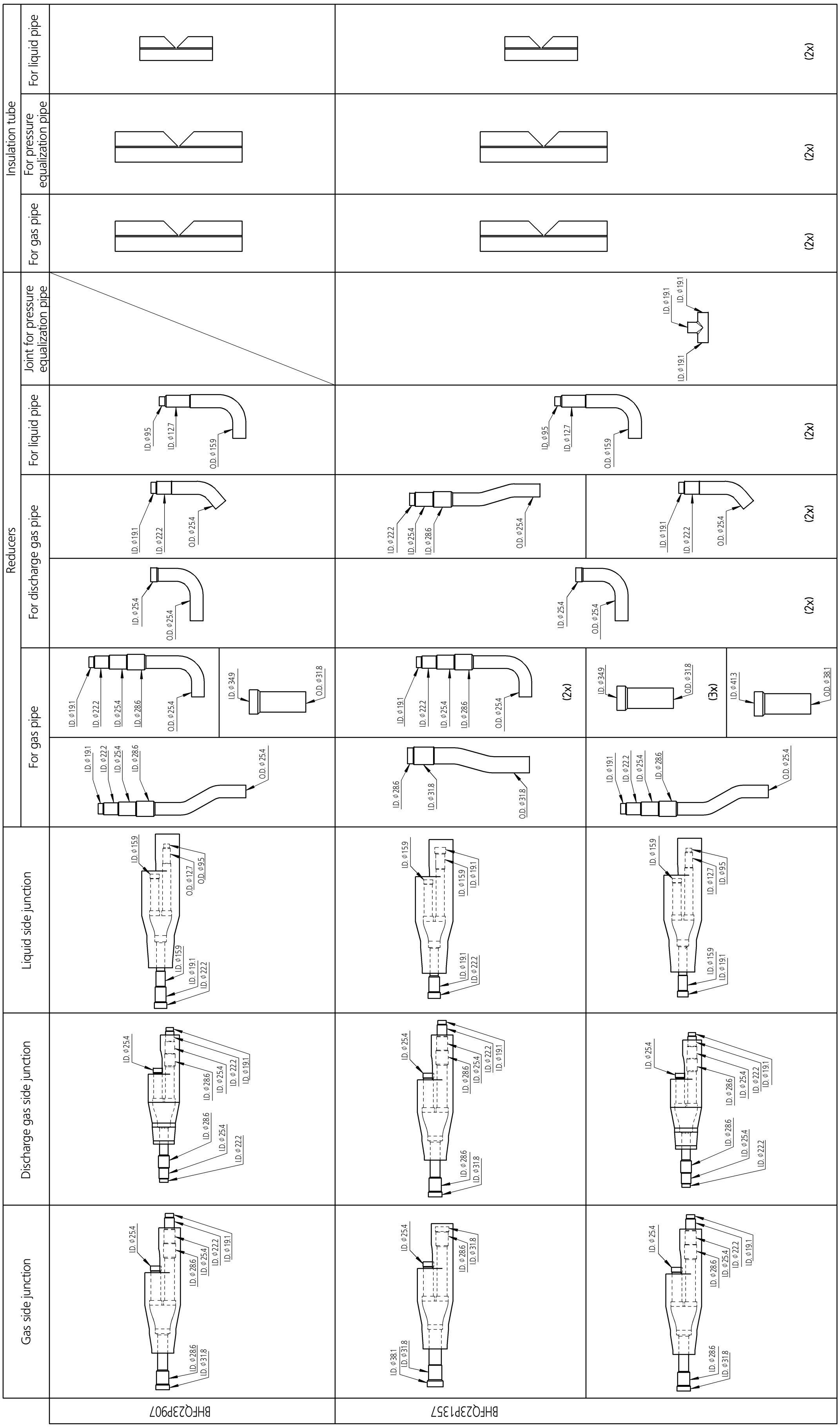
4 - 1 Refnet pipe systems



2TW25799-6

4 Refnet pipe systems

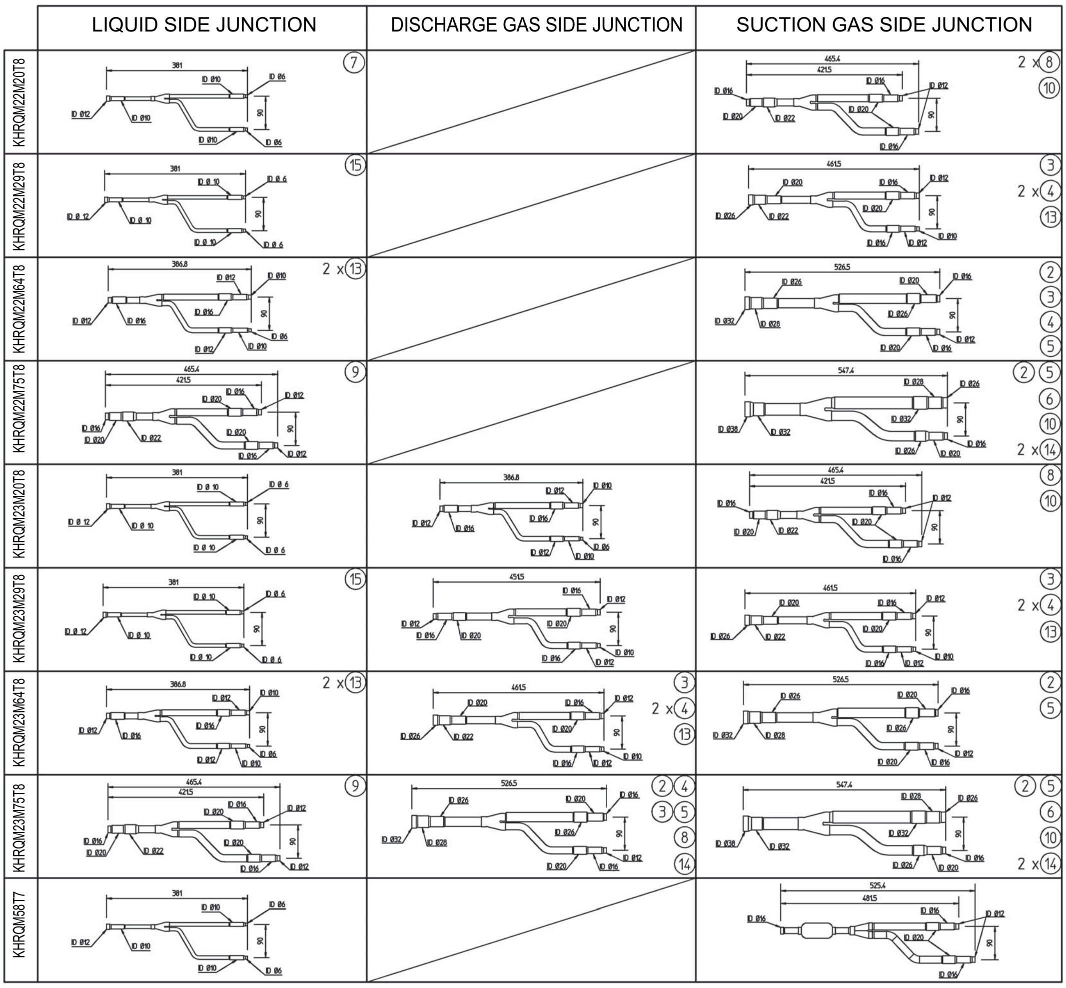
4 - 1 Refnet pipe systems

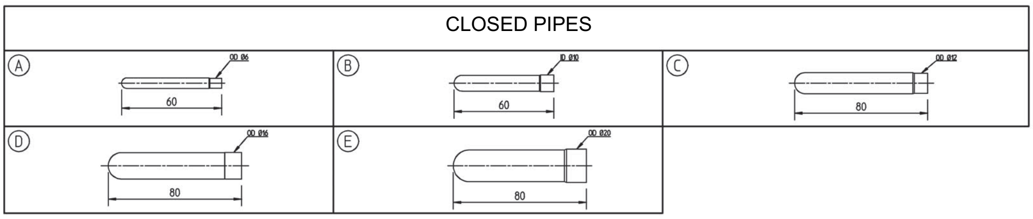


2TW29119-1

4 Refnet pipe systems

4 - 1 Refnet pipe systems

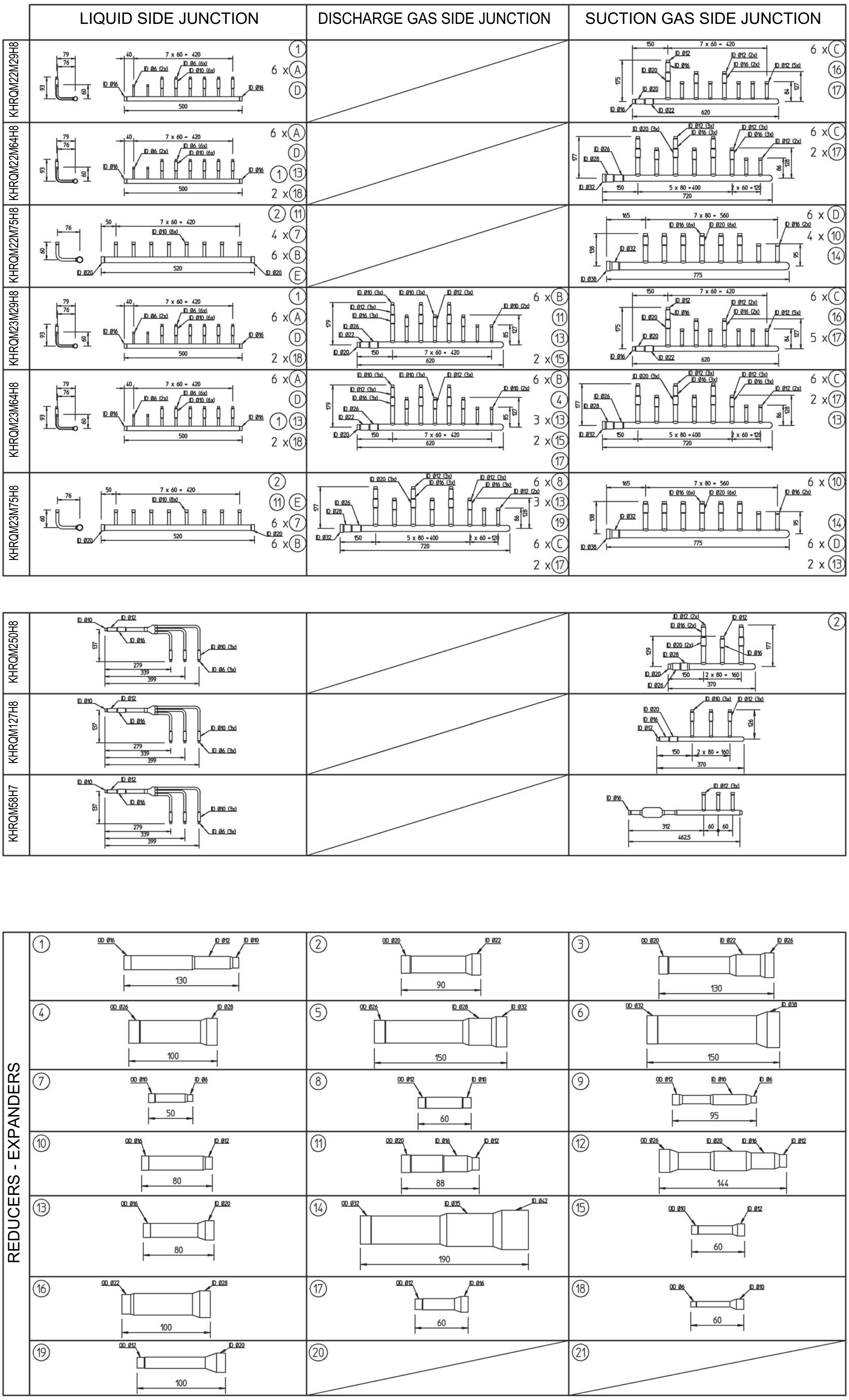




1TW29479-1A

4 Refnet pipe systems

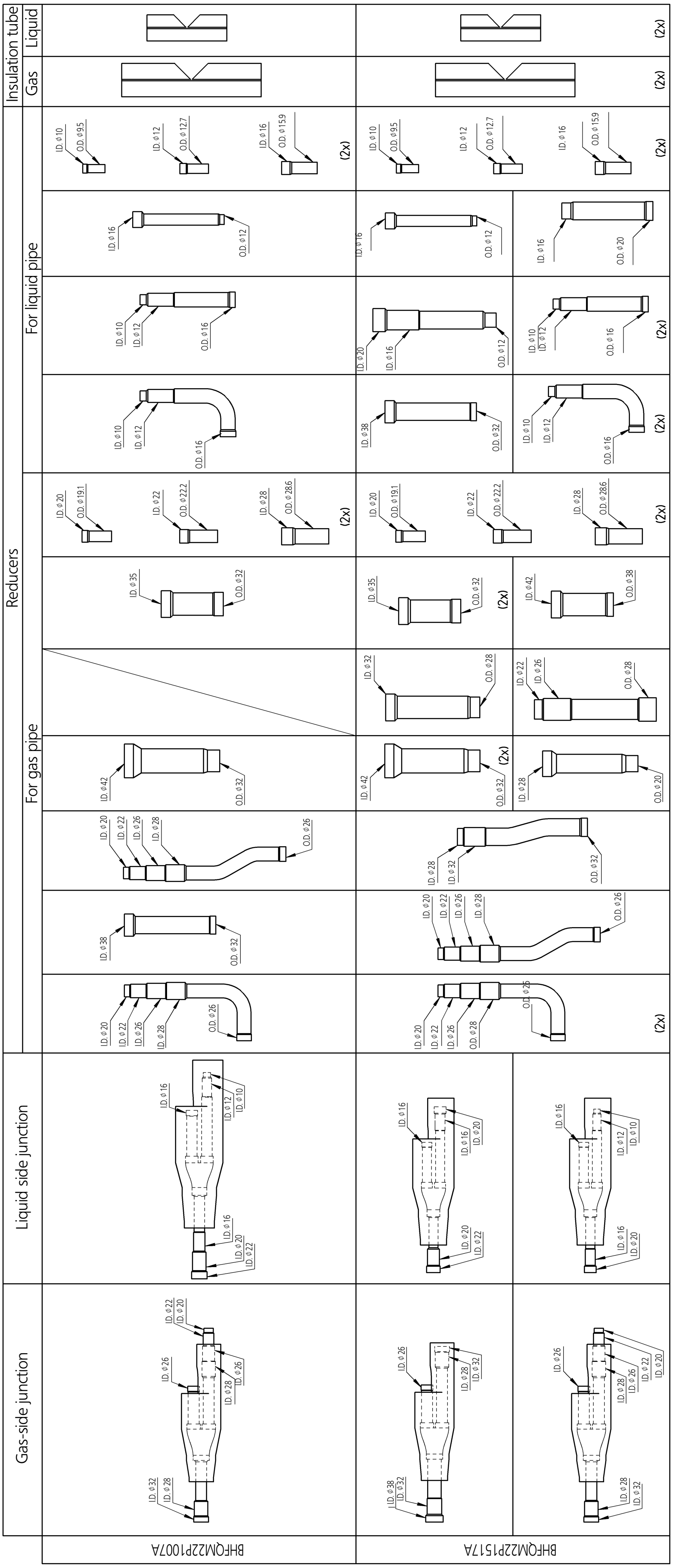
4 - 1 Refnet pipe systems



1TW29479-1A

4 Refnet pipe systems

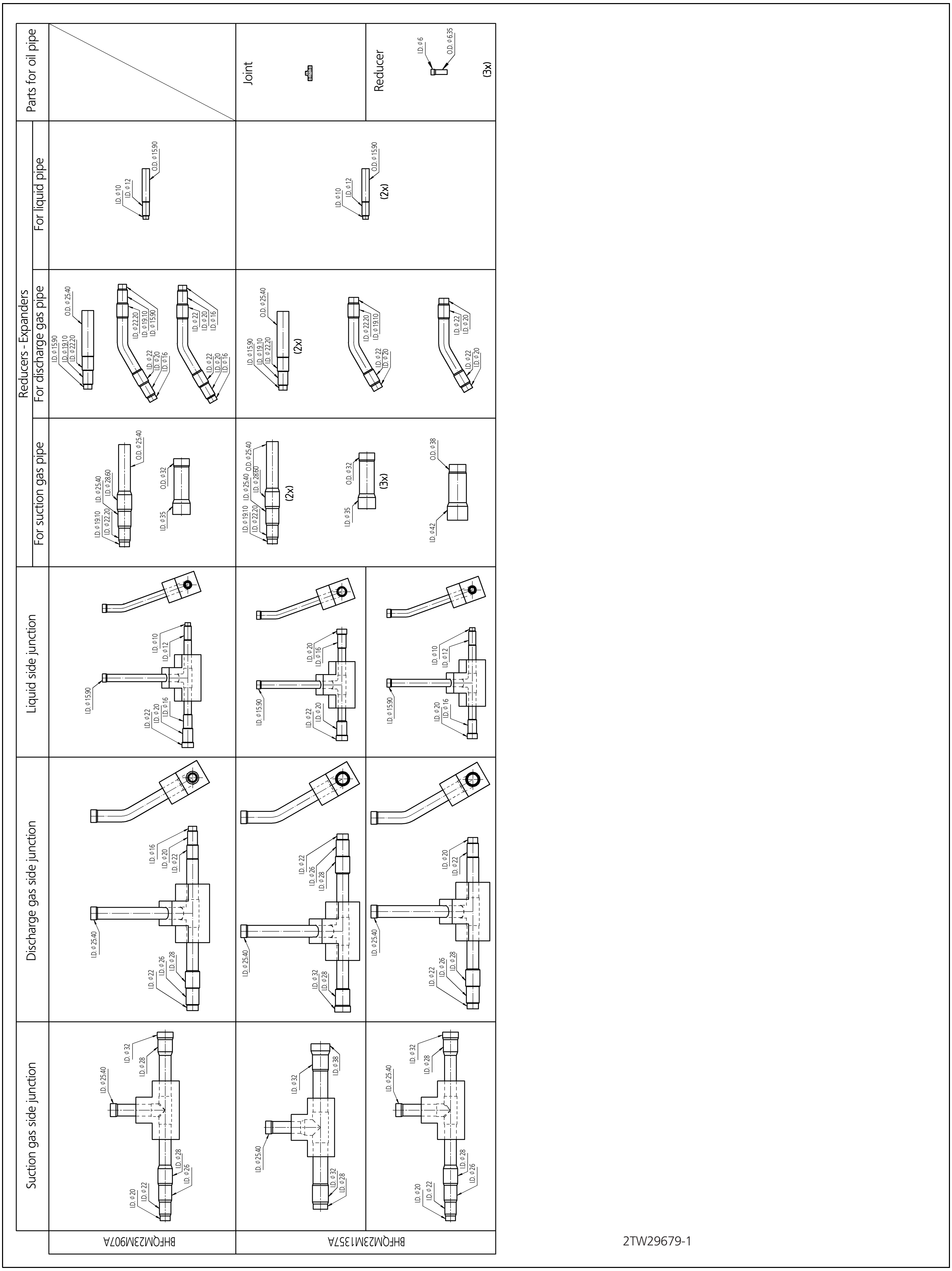
4 - 1 Refnet pipe systems



2TW29659-1

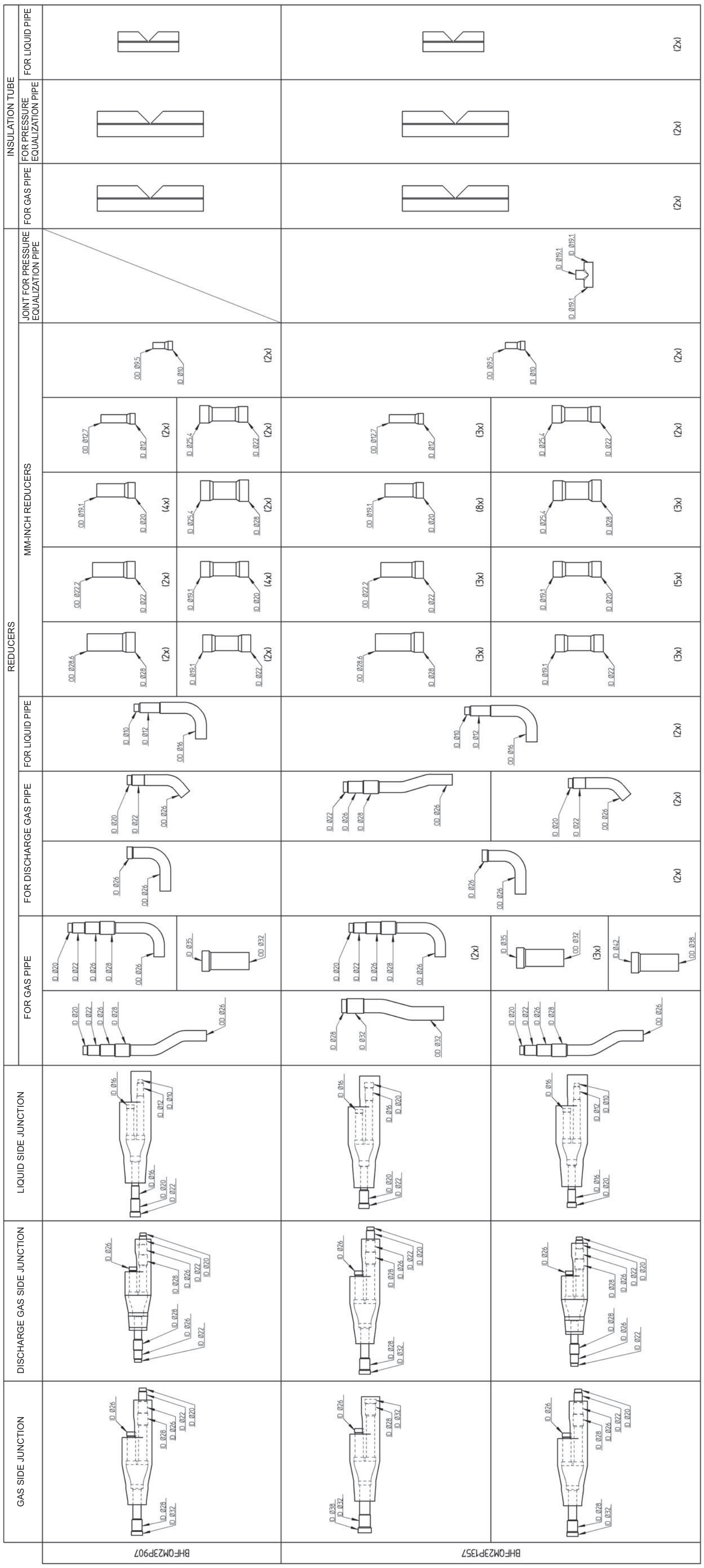
4 Refnet pipe systems

4 - 1 Refnet pipe systems



4 Refnet pipe systems

4 - 1 Refnet pipe systems



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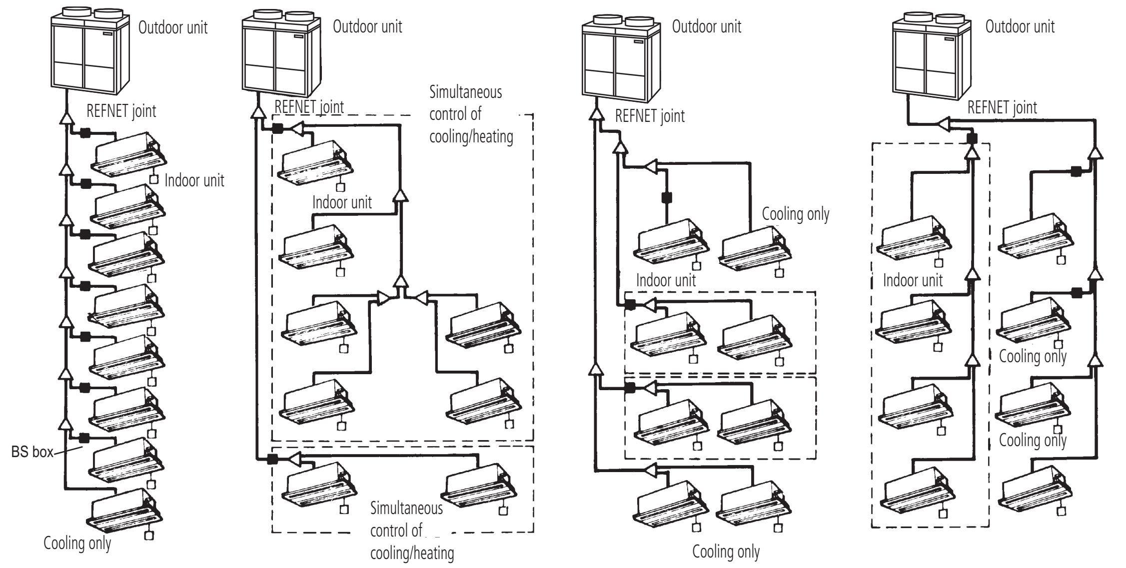
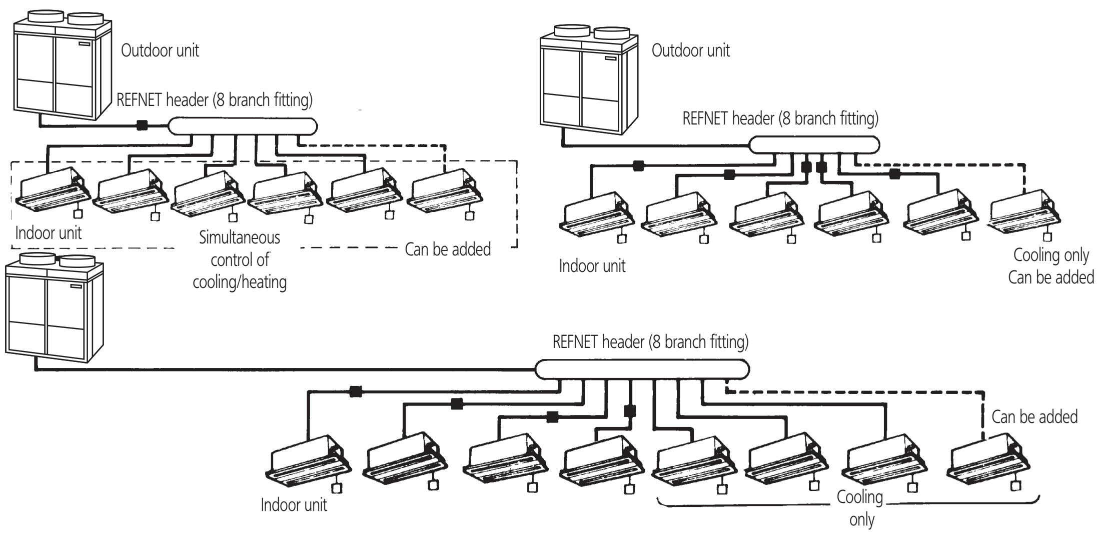
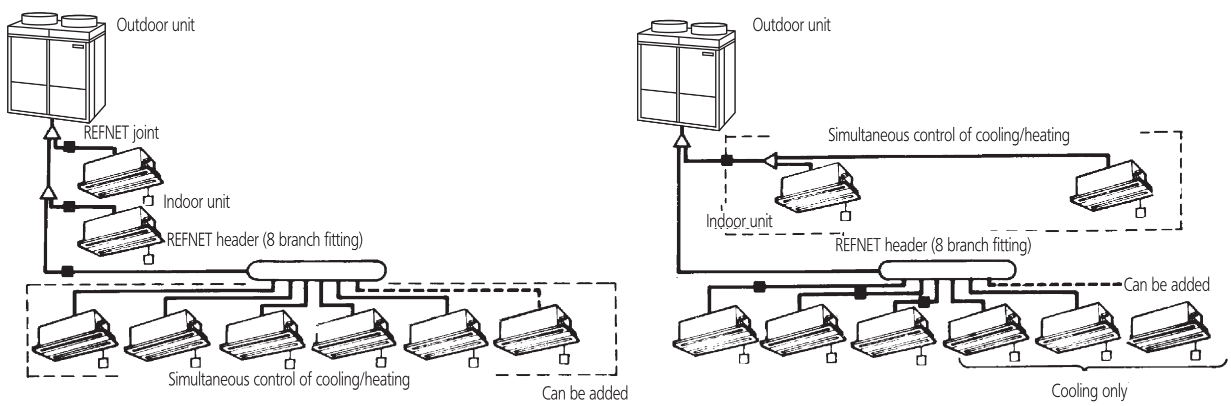
4 Refnet pipe systems

4 - 1 Refnet piping layouts

Type of fitting	Sample systems
Distribution by REFNET joints	
Distribution by REFNET header	
Distribution by REFNET joints and headers	

4 Refnet pipe systems

4 - 2 Piping thickness

Piping diameter	Material	Minimum thickness [mm]
Ø 6.4	O	0.8
Ø 9.5	O	0.8
Ø 12.7	O	0.8
Ø 15.9	O	0.99
Ø 19.1	1/2H	0.8
Ø 22.2	1/2H	0.8
Ø 25.4	1/2H	0.88
Ø 28.6	1/2H	0.99
Ø 31.8	1/2H	1.10
Ø 34.9	1/2H	1.21
Ø 38.1	1/2H	1.32
Ø 41.3	1/2H	1.43

O annealed

1/2H half-hard

For half hard pipes the maximum allowed tensile stress is 61 N/mm^2. For this reason the 0.2% proof strength of the half hard pipe shall be minimum 61 N/mm^2.

The bending radius is more than or equal to 3 times the diameter of the pipe.

VRV products are not within the scope of the Eurovent certification programme.

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The present publication supersedes EEDEN12-200
Prepared in Belgium by Lannoo (www.lannooprint.be), a company whose concern for the environment is set in the EMAS and ISO 14001 systems.
Responsible Editor: Daikin Europe N.V., Zandvoordestraat 300, B-8400 Oostende