DAIKIN

Air Conditioners

Technical Data

VRV®

Air-cooled selection procedure

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1 Selection procedure VRV®III-C system based on heating load

1 - 1 Indoor unit selection

Enter indoor unit capacity tables at given indoor and outdoor temperature.

Select the unit that the capacity is the nearest to and higher than the given load.

NOTE

1 Individual indoor unit capacity is subject to change by the combination. Actual capacity has to be calculated according to the combination by using outdoor units capacity table.

1 - 2 Outdoor unit selection

Allowable combinations are indicated in indoor unit combination total capacity index table.

In general, oudoor units can be selected as follows though the location of the unit, zoning and usage of the rooms should be considered.

The indoor and outdoor unit combination is determined that the sum of indoor unit capacity index is nearest to and smaller than the capacity index at 100 % combination ratio of each outdoor unit. Up to 32 indoor units can be connected to one outdoor unit. It is recommended to choose a larger outdoor unit if the installation space is large enough.

If the combination ratio is higher than 100 %, the indoor unit selection will have to be reviewed by using actual capacity of each indoor unit.

Indoor unit combination total capacity index table

Outdoor unit	Indoor unit combination ratio								
	130 %	120 %	110 %	100 %	90 %	80 %	70%	60 %	50 %
RTSYQ10PY1	325	300	275	250	225	200	175	150	125
RTSYQ14PY1	455	420	385	350	315	280	245	210	175
RTSYQ16PY1	520	480	440	400	360	320	280	240	200
RTSYQ20PY1	650	600	550	500	450	400	350	300	250

Indoor unit capacity index

Model	20	25	32	40	50	63	71	80	100	125	200	250
Capacity index	20	25	31.25	40	50	62.5	71	80	100	125	200	250

1 Selection procedure VRV®III-C system based on heating load

1 - 3 Actual performance data

Use outdoor unit capacity tables

Determine the correct table according to the outdoor unit model and combination ratio.

Enter the table at given indoor and outdoor temperature and find the outdoor capacity and power input. The individual indoor unit capacity (power input) can be calculated as follows:

$$ICA = \frac{OCA \times INX}{TNX}$$

ICA: Individual indoor unit capacity (power input)
OCA: Outdoor unit capacity (power input)
INX: Individual indoor unit capacity index
TNX: Total capacity index

Then, correct the indoor unit capacity according to the piping length.
If the corrected capacity is smaller than the load, the size of indoor unit has to be increased. Repeat the same selection procedure.

1 - 4 Selection example based on heating load

1 Given

- Design condition
  heating: indoor 20°CWB, outdoor -9.5°CDB, -10.0°CWB
- heating load

Room	A	B	C	D	E	F	G	H
Load (kW)	2.2	2.1	5.5	4.0	3.5	2.6	3.5	4.2

- Power supply: 3-phase 380V/50Hz

2 Indoor unit selection

Select indoor type: duct, cassette, floor standing, ...

We select the roundflow cassette (FXFQ-P)

Select indoor unit size using indoor capacity tables.

Conditions: indoor 20°CWB, outdoor -9.5°CDB, -10.0°CWBSelection results are as follows:

Room	A	B	C	D	E	F	G	H
Load (kW)	2.2	2.1	5.5	4.0	3.5	2.6	3.5	4.2
Unit size	25	25	63	50	40	32	40	50
Capacity	2.4	2.4	6.1	4.8	3.8	3.1	3.8	4.8

- Calculate total indoor unit capacity index: 2 x 25 + 1 x 31.25 + 2 x 40 + 2 x 50 + 1 x 62.5 = 323.75

3 Outdoor unit selection

Select outdoor unit type: Heat Recovery, Heat Pump, ...

Here we select VRV®III-C

Total capacity index of indoor units = 323.75

Select outdoor unit where total capacity index is 375 close to 100% connection ratio.

Calculate actual connection ratio:

RTSQ10P: 250 at 100 % -> 323.75 / 250 = 129.5%

RTSQ14P: 350 at 100 % -> 323.75 / 350 = 92.5 %.

Because of the high heating capacity of the cold region VRV®, we can make a selection close to 130% connection ratio.

Calculate outdoor capacity.

RTSQ10P at 130% at design conditions: 28.4

RTSQ10P at 120% at design conditions: 28.3

Interpolate:

28.3	?	28.4
300	323.75	325

28.3 + (28.4 - 28.3) / (325-300) x (323.75-300) = 28.395

1 Selection procedure VRV®III-C system based on heating load

1 - 4 Selection example based on heating load

4 Correction factors

For refrigerant piping:

Check graphs in the next chapter of this databook.

For this example we assume a correction factor of 1.

For defrost factor (only in heating):

The capacity tables in the databook do not take account the reduction in capacity when frost has accumulated or while the defrosting operation is in progress. The integrated heating capacity (which takes these factors into account) can be calculated by multiplying the capacity from the capacity tables with the defrost factor.

For this example with an outdoor temperature of -10°C, the defrost factor is 1.

actual outdoor capacity = outdoor unit capacity x refrigerant piping correction factor x defrost factor

actual indoor capacity = outdoor capacity x refrigerant piping correction factor x defrost factor x indoor unit index/total capacity index

actual outdoor capacity = 28.395 x 1 x 1 = 28.395

Calculate actual indoor capacity. If the delivered capacity is not satisfactory a larger sized indoor unit needs to be selected. Than the calculation needs to be done again.

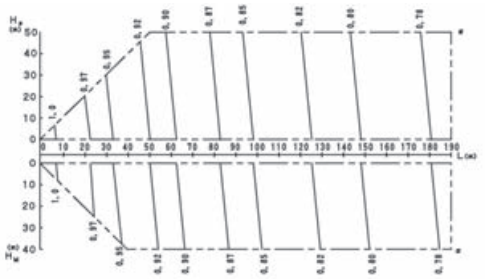
	total load	unit	cap. Index	outdoor unit capacity	actual indoor unit capacity
A	2.2	25	25	28.395	2.19
B	2.1	25	25		2.19
C	5.5	63	62.5		5.48
D	4	50	50		4.39
E	3.5	40	40		3.51
F	2.6	32	31.25		2.74
G	3.5	40	40		3.51
H	4.2	50	50		4.39
	27.6		323.75		

2 Capacity correction ratio

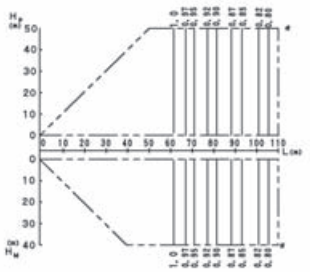
2 - 1 VRV®III-C

RTSYQ10PY1

- Rate of change in cooling capacity



- Rate of change in heating capacity



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NOTES

1 These figures illustrate the rate of change in capacity of a standard indoor unit system at maximum load (with the thermostat set to maximum) under standard conditions. Moreover, under partial load conditions there is only a minor deviation from the rate of change in capacity shown in the above figures.

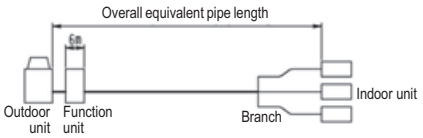
2 With this outdoor unit, evaporating pressure constant control when cooling, and condensing pressure constant control when heating is carried out.

3 Method of calculating A/C (cooling / heating) capacity:
The maximum A/C capacity of the system will be either the total A/C capacity of the indoor units obtained from capacity characteristics table or the maximum A/C capacity of outdoor units as mentioned below, wichever smaller.
Calculating A/C capacity of outdoor units

- Condition: Indoor unit combination ratio does not exceed 100%
  Maximum A/C capacity of outdoor units = A/C capacity of outdoor units obtained from capacity characteristic table at the 100% combination
  x Capacity change rate due to piping length to the farthest indoor unit
- Condition: Indoor unit combination ratio exceeds 100%
  Maximum A/C capacity of outdoor units = A/C capacity of outdoor units obtained from capacity characteristic table at the combination
  x Capacity change rate due to piping length to the farthest indoor unit

4 When overall equivalent pipe length is 90m or more, the diameter of the main gas and liquid pipes (outdoor unit-branch sections) must be increased. (Consider the equivalent pipe length of function unit as 6m)
Diameter of above case

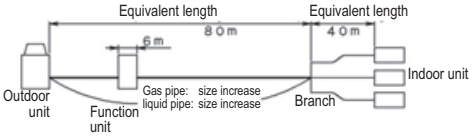
Model	gas	liquid
RTSYQ10PY1(E)	ø 25.4 ❉	ø 12.7



❉If available on the site, use this size. Otherwise, not increased.

5 Read cooling/heating capacity rate of change in the above figures based on the following equivalent length.
Overall equivalent length =
(Equivalent length to main pipe) x correction factor + (equivalent length after branching)
Choose a correction factor from the following table.
When cooling capacity is calcurated: gas pipe size
When heating capacity is calcurated: liquid pipe size.

Rate of change (object piping)	correction factor	
	standard size	Size increase
Cooling (gas pipe)	1.0	0.5
Heating (liquid pipe)	1.0	0.2



In the above case
(Cooling) Overall equivalent length = 80mx0.5+40m=80m
(Heating) Overall equivalent length = 80mx0.2+40m=56m
The rate of change in cooling capacity when Hp=0m is thus approximatly 0.87
heating capacity when Hp=0m is thus approximatly 1.0

EXPLANATION OF SYMBOLS

H_p : Level difference (m) between indoor and outdoor units where indoor unit in inferior position
H_M : Level difference (m) between indoor and outdoor units where indoor unit in superior position
L : Equivalent pipe length (m)
α : Rete of change in cooling/heating capacity

[Diameter of the main pipes (standard size)]

Model	gas	liquid
RTSYQ10PY1 (E)	ø 22.2	ø 9.5

[Temper grade and thickness]

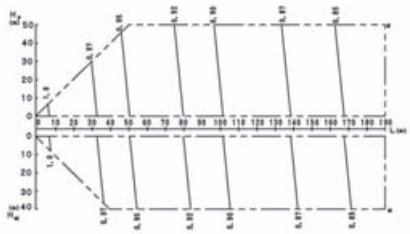
Temper grade	0 Type		1/2H Type	
Outer diameter	ø 9.5	ø 12.7	ø 22.2	ø 25.4
Minimum wall thickness	0.80	0.80	0.80	0.88

2 Capacity correction ratio

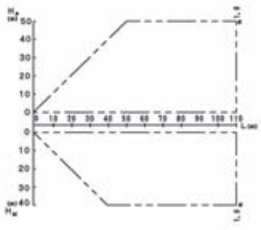
2 - 1 VRV®III-C

RTSYQ14PY1

- Rate of change in cooling capacity



- Rate of change in heating capacity



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NOTES

1 These figures illustrate the rate of change in capacity of a standard indoor unit system at maximum load (with the thermostat set to maximum) under standard conditions. Moreover, under partial load conditions there is only a minor deviation from the rate of change in capacity shown in the above figures.

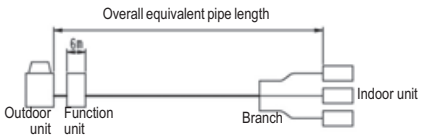
2 With this outdoor unit, evaporating pressure constant control when cooling, and condensing pressure constant control when heating is carried out.

3 Method of calculating A/C (cooling / heating) capacity:
The maximum A/C capacity of the system will be either the total A/C capacity of the indoor units obtained from capacity characteristics table or the maximum A/C capacity of outdoor units as mentioned below, wichever smaller.
Calculating A/C capacity of outdoor units

- Condition: Indoor unit combination ratio does not exceed 100%
  Maximum A/C capacity of outdoor units = A/C capacity of outdoor units obtained from capacity characteristic table at the 100% combination
  x Capacity change rate due to piping length to the farthest indoor unit
- Condition: Indoor unit combination ratio exceeds 100%
  Maximum A/C capacity of outdoor units = A/C capacity of outdoor units obtained from capacity characteristic table at the combination
  x Capacity change rate due to piping length to the farthest indoor unit

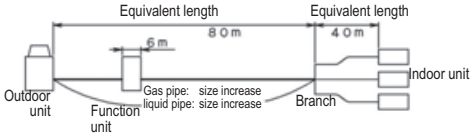
4 When overall equivalent pipe length is 90m or more, the diameter of the main gas and liquid pipes (outdoor unit-branch sections) must be increased. (Consider the equivalent pipe length of function unit as 6m)
Diameter of above case

Model	gas	liquid
RTSYQ14PY1(E)	not increased	ø 15.9



5 Read cooling/heating capacity rate of change in the above figures based on the following equivalent length.
Overall equivalent length =
(Equivalent length to main pipe) x correction factor + (equivalent length after branching)
Choose a correction factor from the following table.
When cooling capacity is calcurated: gas pipe size
When heating capacity is calcurated: liquid pipe size.

Rate of change (object piping)	correction factor	
	standard size	Size increase
Cooling (gas pipe)	1.0	/
Heating (liquid pipe)	1.0	0.3



In the above case
(Cooling) Overall equivalent length = 80mx1.0+40m=120m
(Heating) Overall equivalent length = 80mx0.3+40m=64m
The rate of change in cooling capacity when Hp=0m is thus approximatly 0.88
heating capacity when Hp=0m is thus approximatly 1.0

EXPLANATION OF SYMBOLS

H_p : Level difference (m) between indoor and outdoor units where indoor unit in inferior position
H_M : Level difference (m) between indoor and outdoor units where indoor unit in superior position
L : Equivalent pipe length (m)
α : Rete of change in cooling/heating capacity

[Diameter of the main pipes (standard size)]

Model	gas	liquid
RTSYQ14PY1 (E)	ø 28.6	ø 12.7

[Temper grade and thickness]

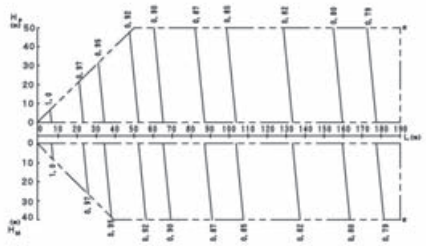
Temper grade	0 Type		1/2H Type
Outer diameter	ø 12.7	ø 15.9	ø 28.6
Minimum wall thickness	0.80	0.99	0.99

2 Capacity correction ratio

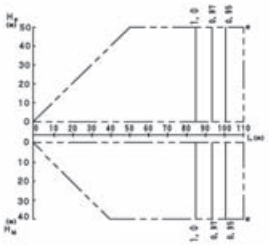
2 - 1 VRV®III-C

RTSYQ16PY1

- Rate of change in cooling capacity



- Rate of change in heating capacity



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NOTES

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2 With this outdoor unit, evaporating pressure constant control when cooling, and condensing pressure constant control when heating is carried out.

3 Method of calculating A/C (cooling / heating) capacity:
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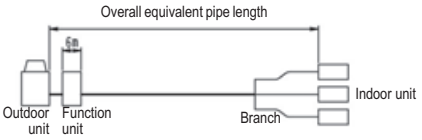
  x Capacity change rate due to piping length to the farthest indoor unit
- Condition: Indoor unit combination ratio exceeds 100%
  Maximum A/C capacity of outdoor units = A/C capacity of outdoor units obtained from capacity characteristic table at the combination
  x Capacity change rate due to piping length to the farthest indoor unit

4 When overall equivalent pipe length is 90m or more, the diameter of the main gas and liquid pipes (outdoor unit-branch sections) must be increased. (Consider the equivalent pipe length of function unit as 6m)
Diameter of above case

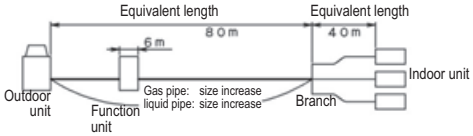
Model	gas	liquid
RTSYQ16PY1(E)	ø 31.8 ❉	ø 15.9



❉If available on the site, use this size. Otherwise, not increased.

5 Read cooling/heating capacity rate of change in the above figures based on the following equivalent length.
Overall equivalent length =
(Equivalent length to main pipe) x correction factor + (equivalent length after branching)
Choose a correction factor from the following table.
When cooling capacity is calcurated: gas pipe size
When heating capacity is calcurated: liquid pipe size.

Rate of change (object piping)	correction factor	
	standard size	Size increase
Cooling (gas pipe)	1.0	0.5
Heating (liquid pipe)	1.0	0.3



In the above case
(Cooling) Overall equivalent length = 80mx0.5+40m=80m
(Heating) Overall equivalent length = 80mx0.3+40m=64m
The rate of change in cooling capacity when Hp=0m is thus approximatly 0.88
heating capacity when Hp=0m is thus approximatly 1.0

EXPLANATION OF SYMBOLS

H_p : Level difference (m) between indoor and outdoor units where indoor unit in inferior position
H_M : Level difference (m) between indoor and outdoor units where indoor unit in superior position
L : Equivalent pipe length (m)
α : Rete of change in cooling/heating capacity

[Diameter of the main pipes (standard size)]

Model	gas	liquid
RTSYQ16PY1 (E)	ø 28.6	ø 12.7

[Temper grade and thickness]

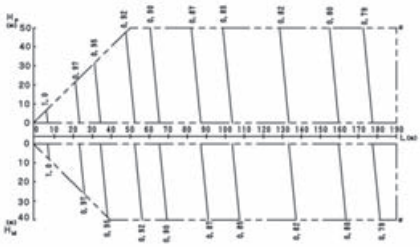
Temper grade	0 Type		1/2H Type	
Outer diameter	ø 12.7	ø 15.9	ø 28.6	ø 31.8
Minimum wall thickness	0.80	0.99	0.99	1.10

2 Capacity correction ratio

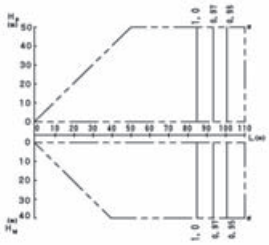
2 - 1 VRV®III-C

RTSYQ20PY1

- Rate of change in cooling capacity



- Rate of change in heating capacity



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NOTES

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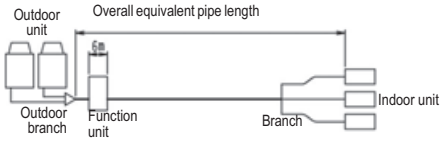
- Condition: Indoor unit combination ratio exceeds 100%
  Maximum A/C capacity of outdoor units = A/C capacity of outdoor units obtained from capacity characteristic table at the combination
  x Capacity change rate due to piping length to the farthest indoor unit

4 When overall equivalent pipe length is 90m or more, the diameter of the main gas and liquid pipes (outdoor unit-branch sections) must be increased. (Consider the equivalent pipe length of function unit as 6m)
Diameter of above case

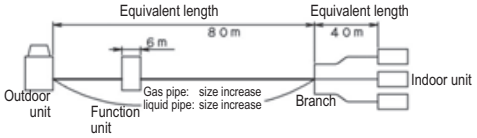
Model	gas	liquid
RTSYQ20PY1(E)	ø 31.8 ❊	ø 19.1



❊If available on the site, use this size. Otherwise, not increased.

5 Read cooling/heating capacity rate of change in the above figures based on the following equivalent length.
Overall equivalent length =
(Equivalent length to main pipe) x correction factor + (equivalent length after branching)
Choose a correction factor from the following table.
When cooling capacity is calcurated: gas pipe size
When heating capacity is calcurated: liquid pipe size.

Rate of change (object piping)	correction factor	
	standard size	Size increase
Cooling (gas pipe)	1.0	0.5
Heating (liquid pipe)	1.0	0.4



In the above case
(Cooling) Overall equivalent length = 80mx0.5+40m=80m
(Heating) Overall equivalent length = 80mx0.4+40m=72m
The rate of change in cooling capacity when Hp=0m is thus approximatly 0.88
heating capacity when Hp=0m is thus approximatly 1.0

EXPLANATION OF SYMBOLS

H_p : Level difference (m) between indoor and outdoor units where indoor unit in inferior position
H_M : Level difference (m) between indoor and outdoor units where indoor unit in superior position
L : Equivalent pipe length (m)
α : Rete of change in cooling/heating capacity

[Diameter of the main pipes (standard size)]

Model	gas	liquid
RTSYQ20PY1 (E)	ø 28.6	ø 15.9

[Temper grade and thickness]

Temper grade	0 Type	1/2H Type		
Outer diameter	ø 15.9	ø 19.1	ø 28.6	ø 31.8
Minimum wall thickness	0.99	0.80	0.99	1.10

3 Integrated heating capacity

RTSYQ-P

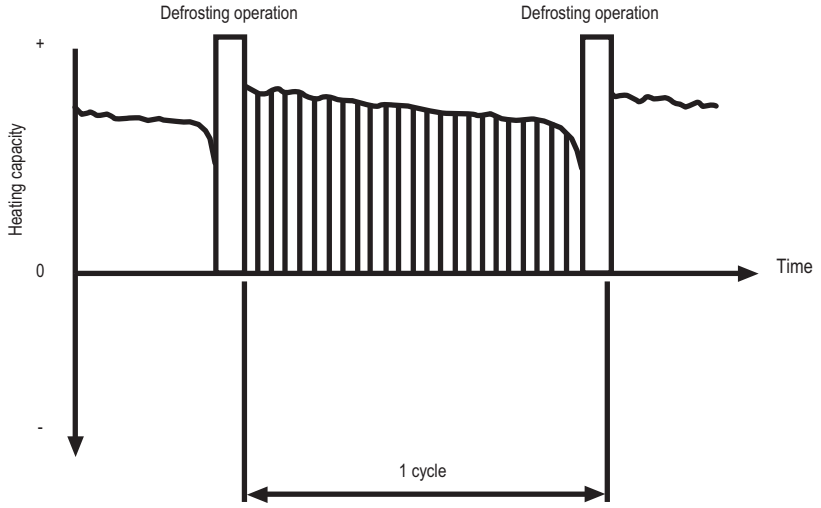
INTEGRATED HEATING CAPACITY COEFFICIENT

The heating capacity tables do not take account of the reduction in capacity, when frost has accumulated or while the defrosting operation is in progress. The capacity values, which take these factors into account, in other words, the integrated heating capacity values, can be calculated as follows:

Formula:
Integrated heating capacity = A
Value given in table of capacity characteristics = B
Integrated correction factor for frost accumulation = C
A = B x C

Integrating correction factor for finding integrated heating capacity

Outdoor Temperature° CDB (° CWB)	-7 (-7.6) or less	-5 (-5.6)	-3 (-3.7)	0 (-0.7)	3 (2.2)	5	7 (6.0)
Correction factor defrost	0.95	0.93	0.88	0.85	0.86	0.90	1.00



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NOTE

1 The figure shows that the integrated heating capacity expresses the integrated capacity for a single cycle (from defrost operation to defrost operation) in terms of time.

Please note that, when there is an accumulation of snow against the outside surface of the outdoor unit heat exchanger, there will always be a temporary reduction in capacity, although this will of course vary in degree in accordance with a number of other factors, such as the outdoor temperature (°CDB), relative humidity (RH) and the amount of frosting which occurs.

4 Refnet pipe systems

As the VRV III-C is produced in Japan in some communications the DIL refnets are mentioned in stead of the DENV refnets. Below you can find a conversion table in order to select the correct DENV refnets.

Refnets

DIL	DENV
KHRP26A22T	KHRQ22M20T
KHRP26A33T	KHRQ22M29T9
KHRP26A72T	KHRQ22M64T
KHRP26A73T	KHRQ22M75T

Headers

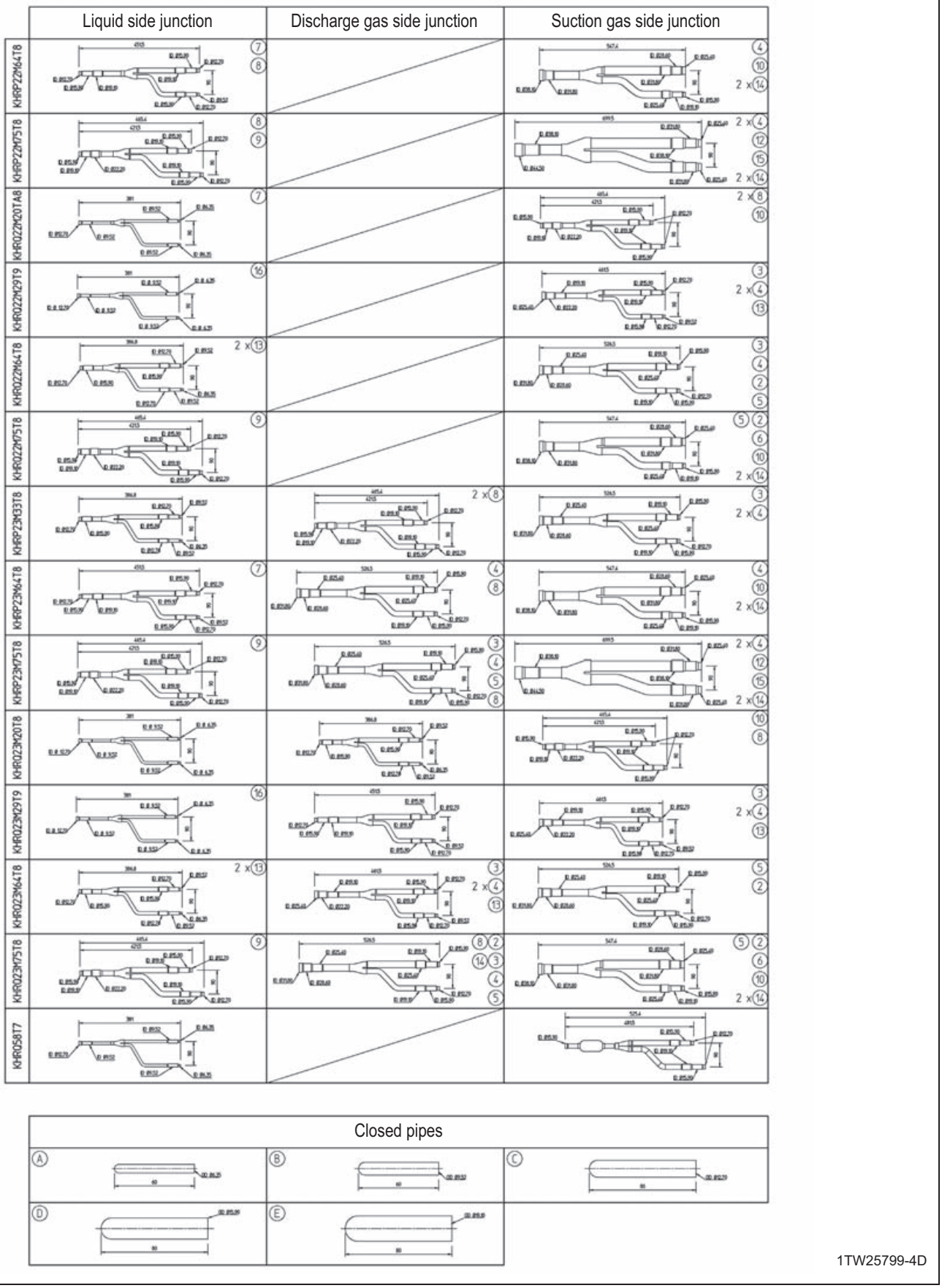
DIL	DENV	
KHRP26M22H	KHRQ22M29H	
KHRP26M33H	KHRQ22M29H	Remark!
KHRP26M72H + KHRP26M73HP	KHRQ22M64H	

Remark: "ø25.4 gas pipe in" is not available for the DENV refnet. This is only required for the 10 HP model using size up AND with an indoor connection ratio of less than 80%.

Multi unit connection

DIL	DENV
BHFP30A56	BHFQ22P1007

4 Refnet pipe systems



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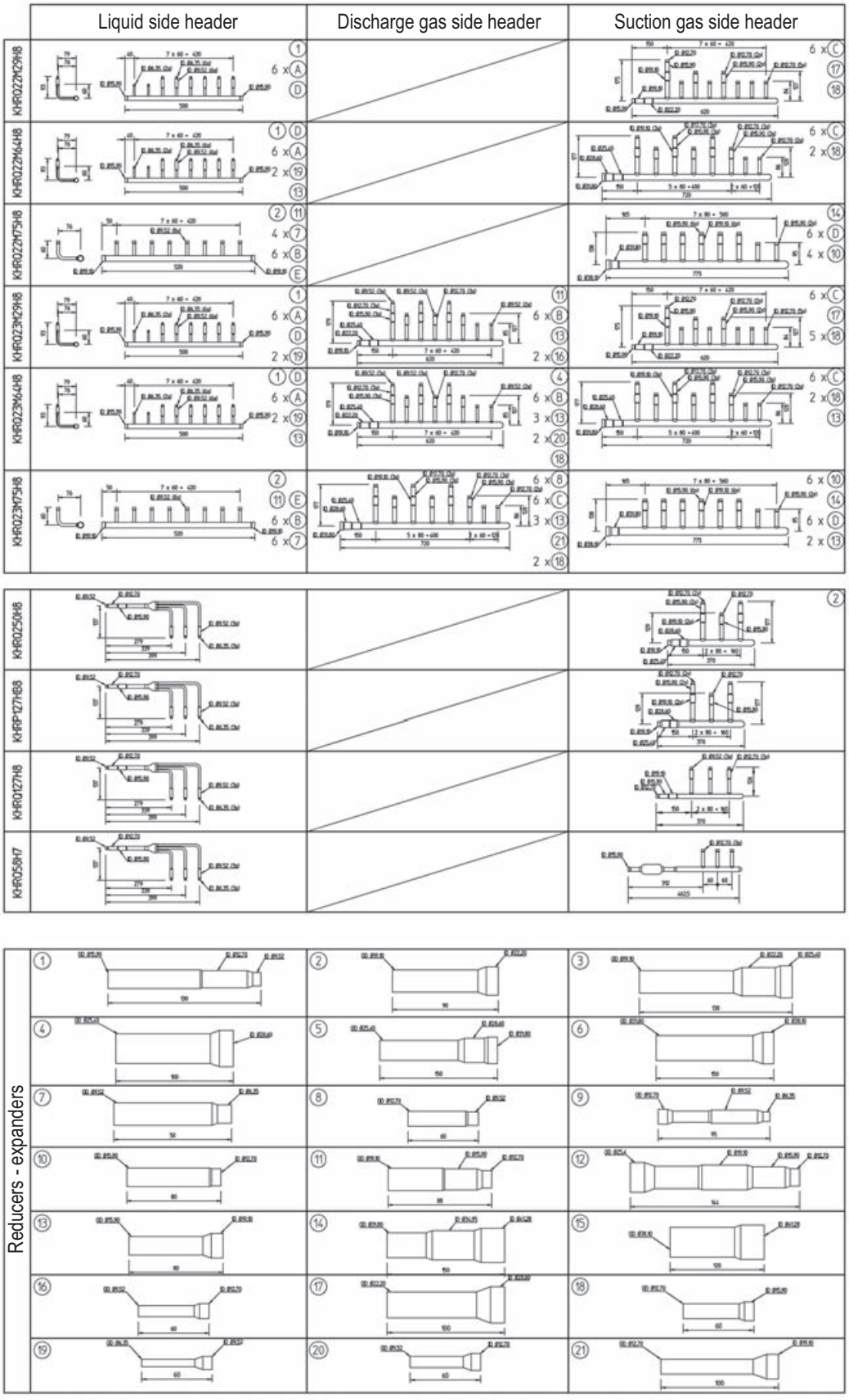
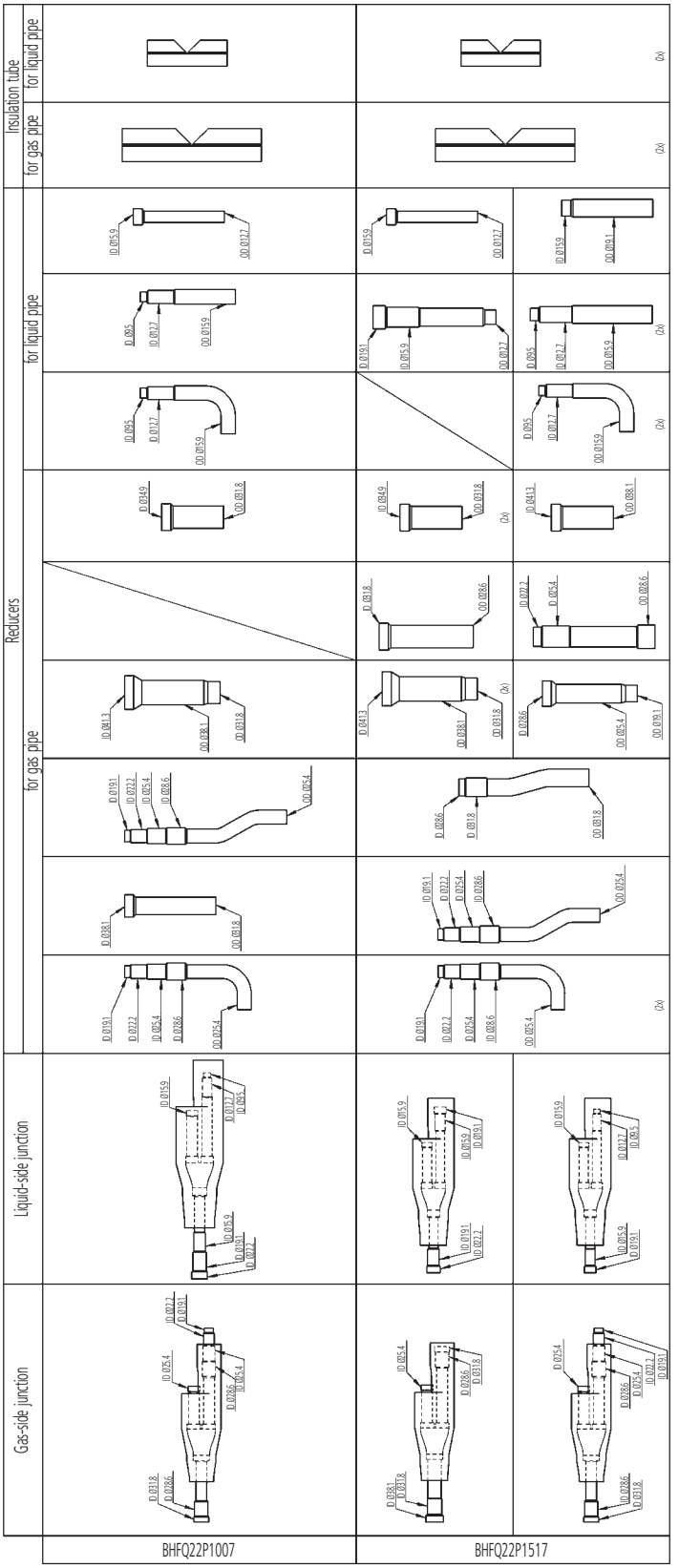
4 Refnet pipe systems



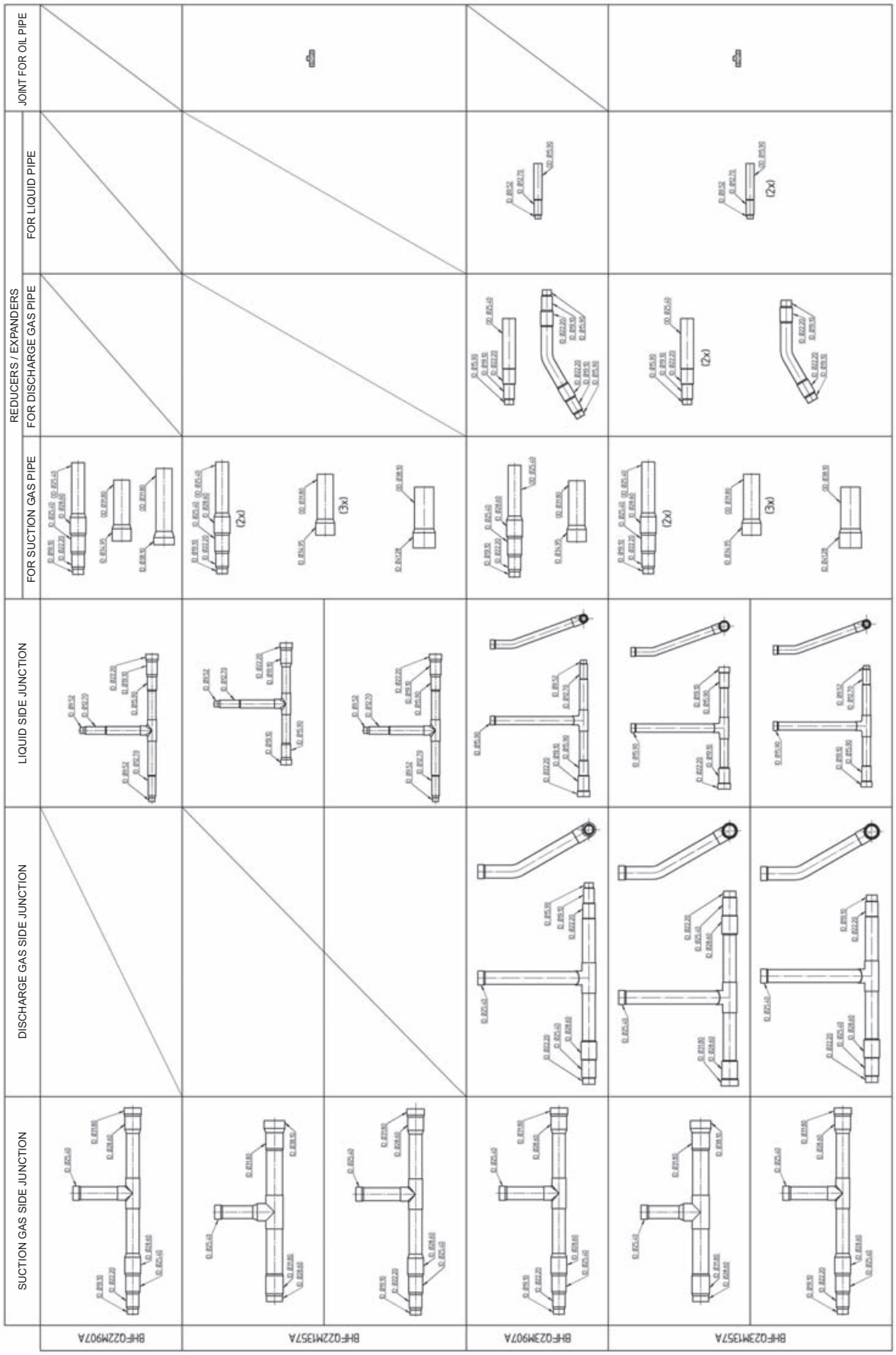
1TW25799-4D

4 Refnet pipe systems



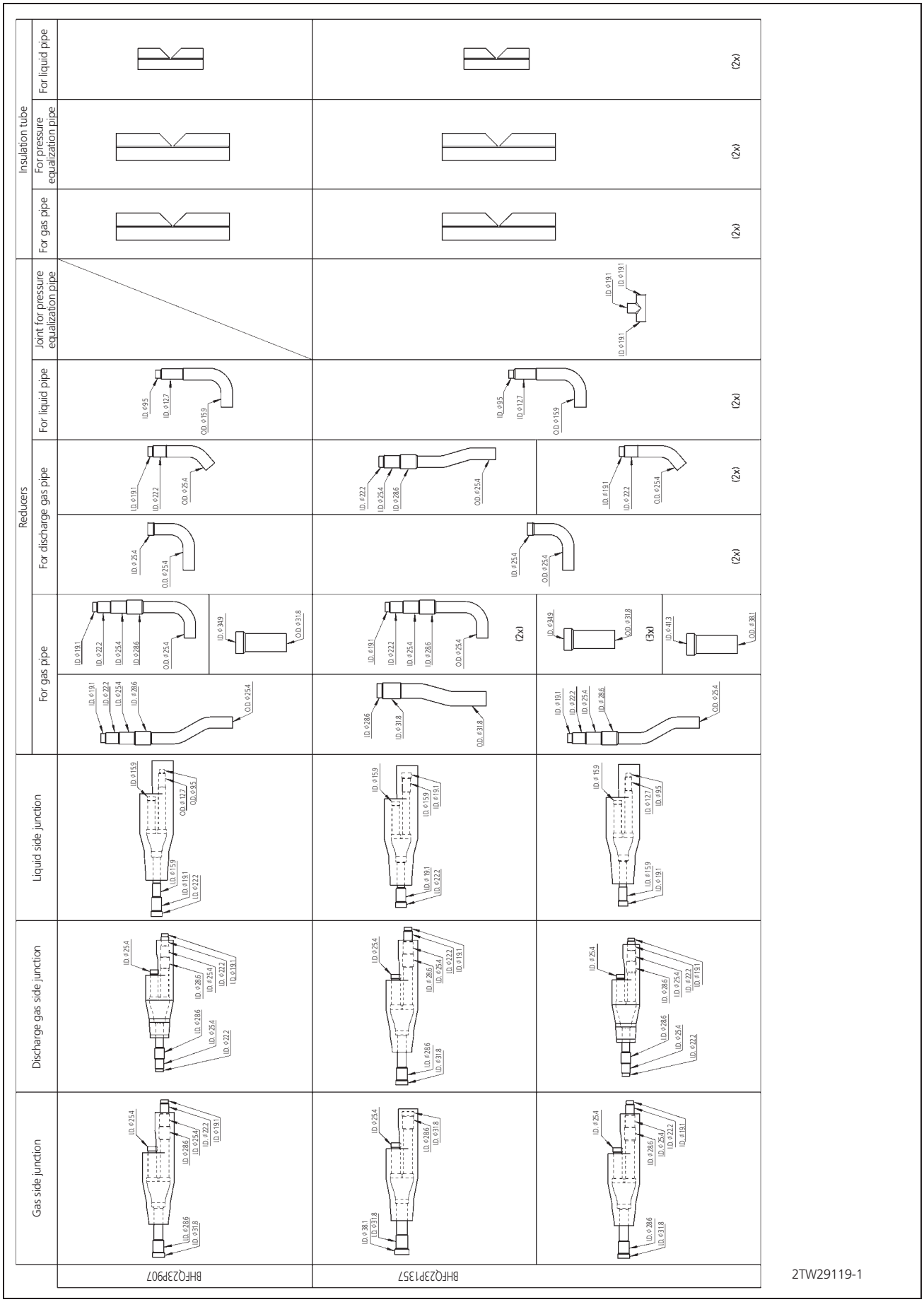
2TW27239-1

4 Refnet pipe systems



2TW25799-6

4 Refnet pipe systems



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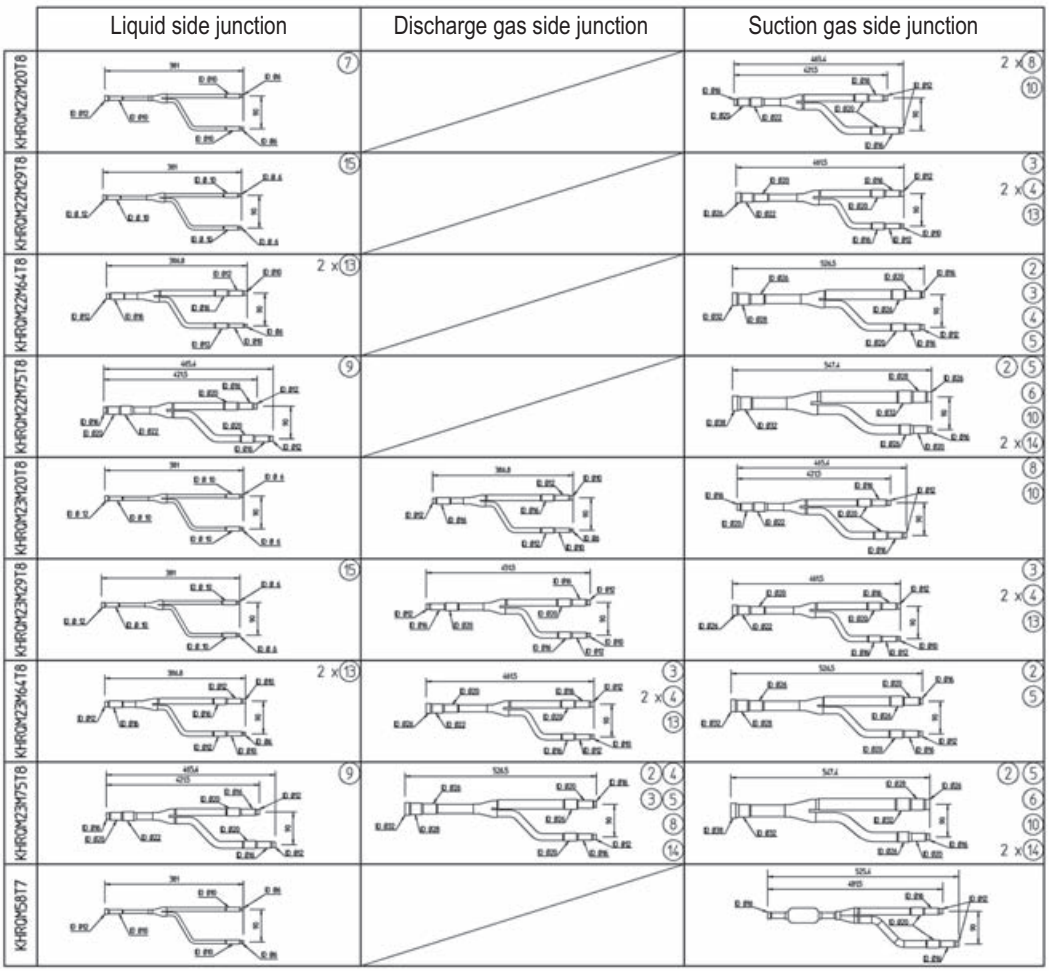
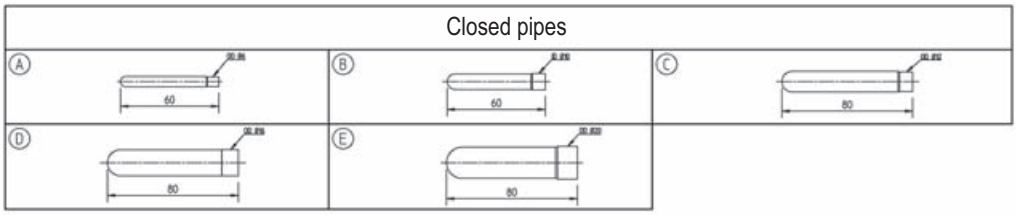
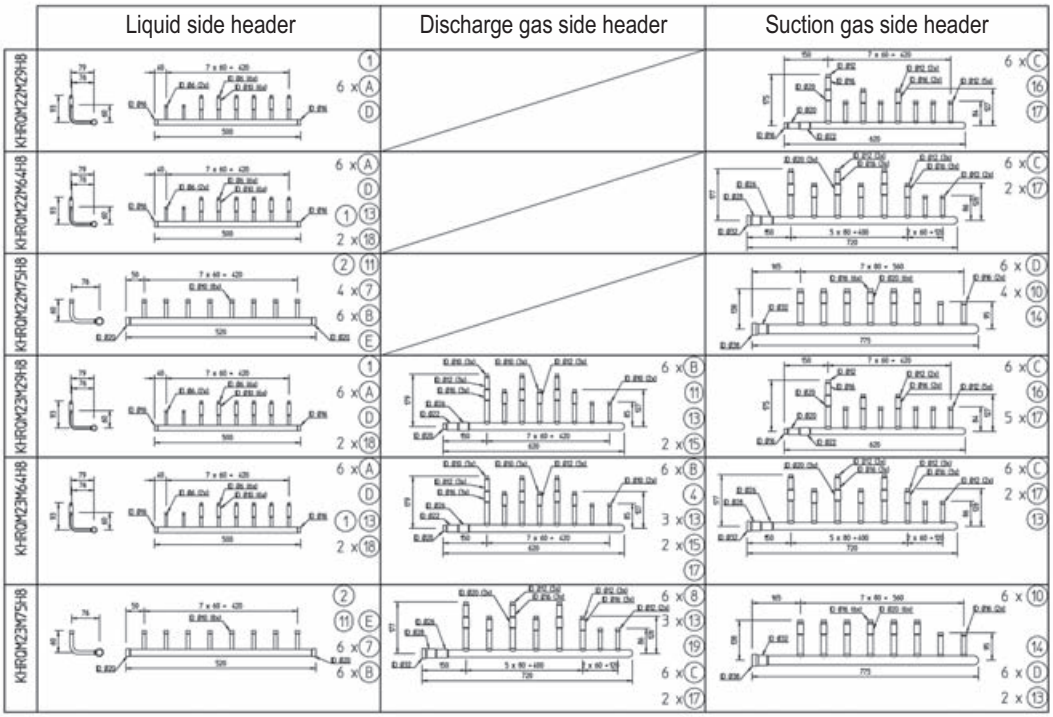
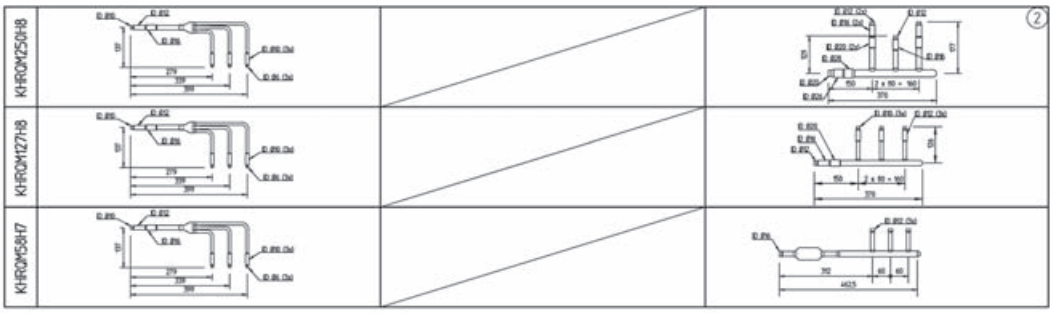


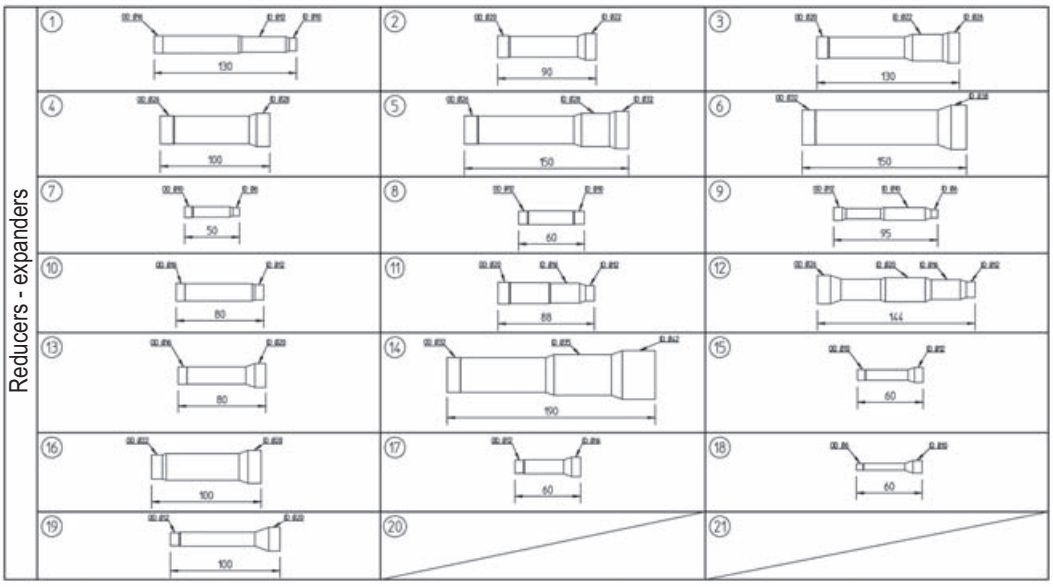


1TW29479-1A

4 Refnet pipe systems

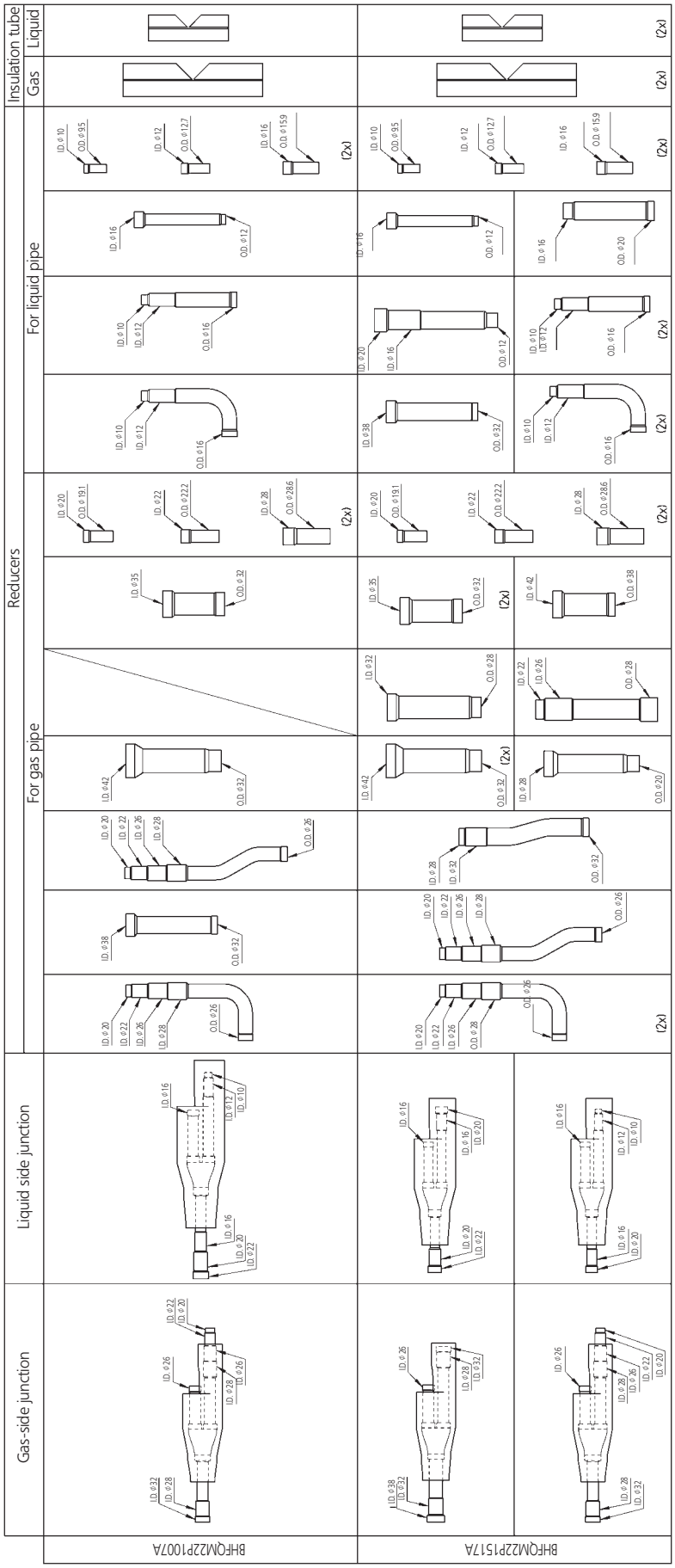






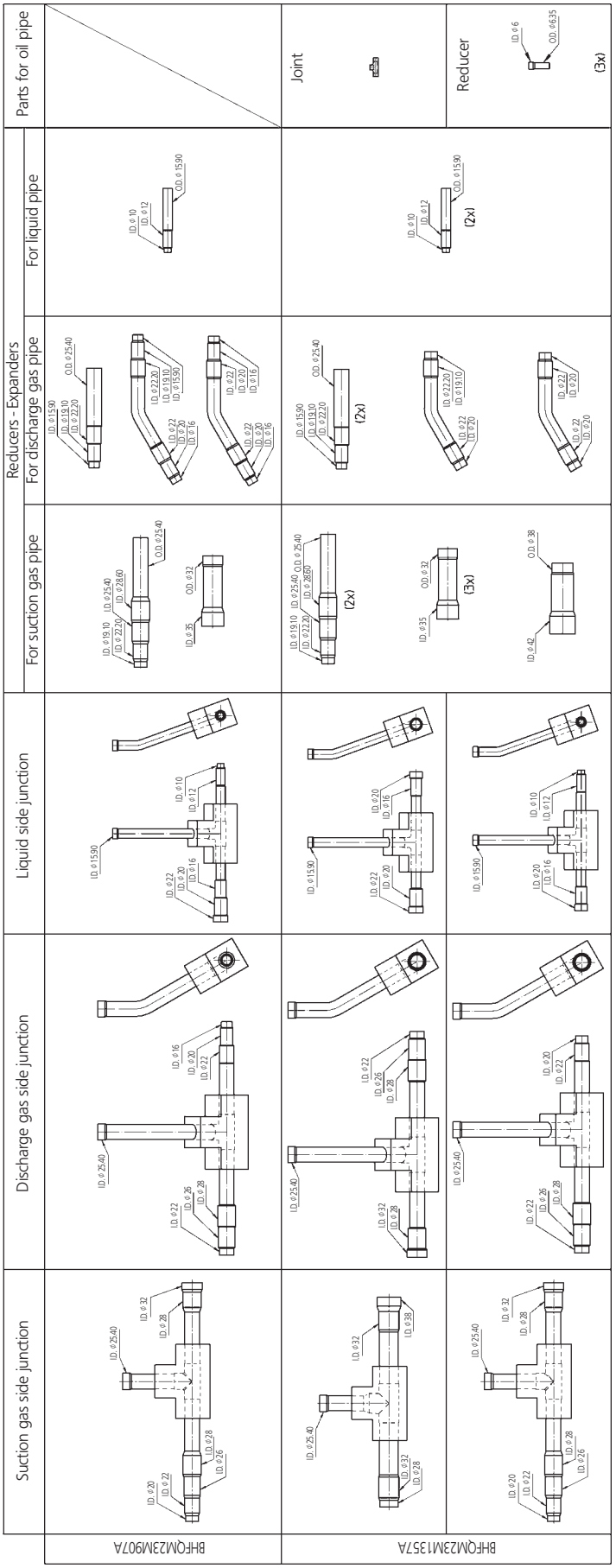
1TW29479-1A

4 Refnet pipe systems



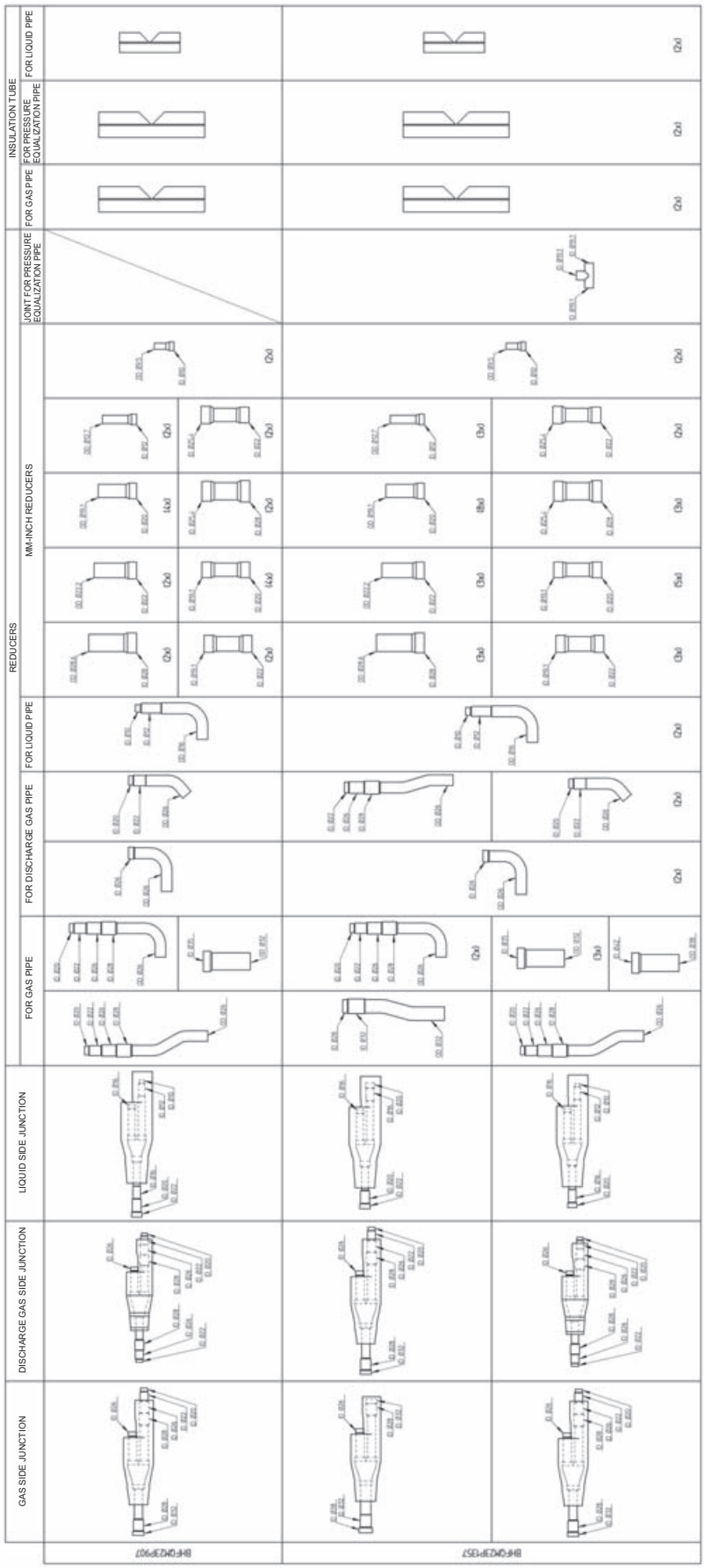
2TW29659-1

4 Refnet pipe systems



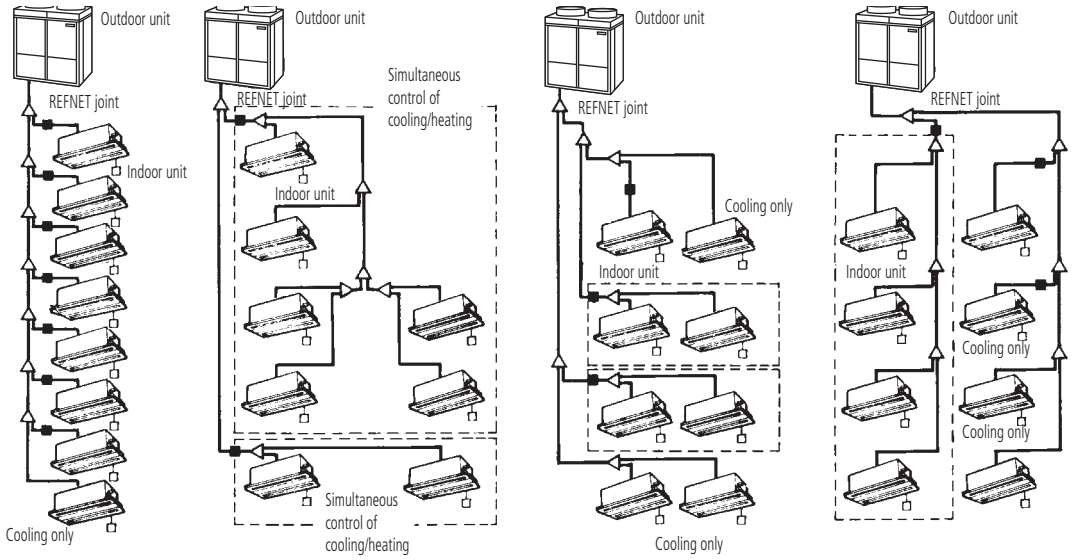
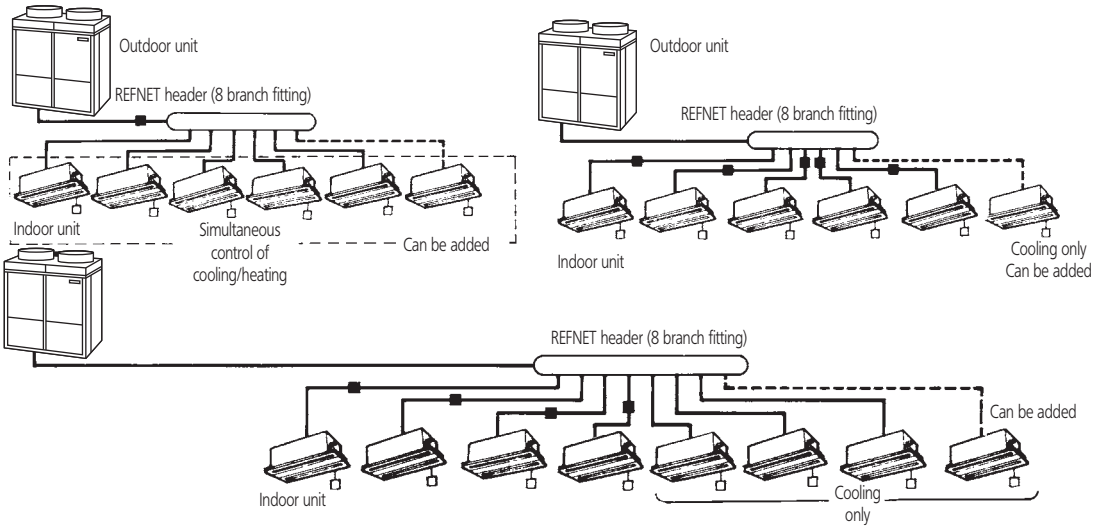
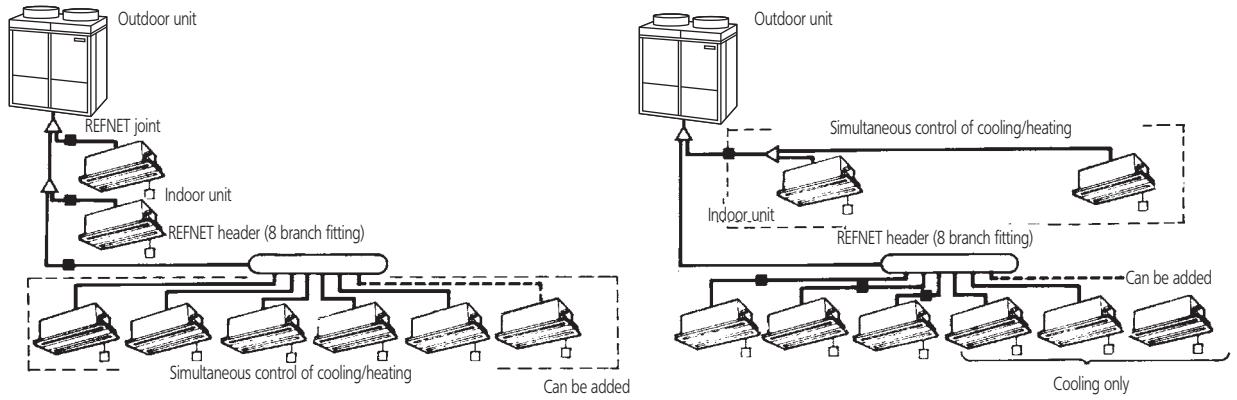
2TW29679-1

4 Refnet pipe systems



1TW29119-2

5 Example of Refnet piping layouts

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

6 Refrigerant pipe selection

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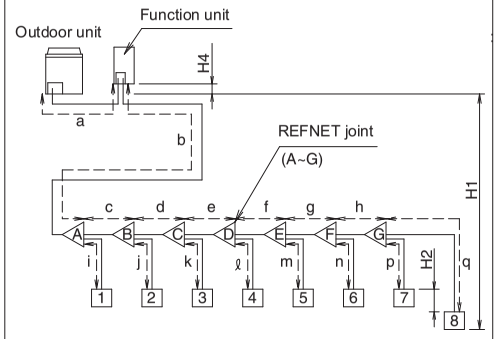
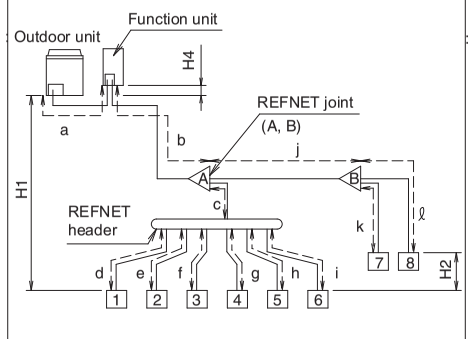
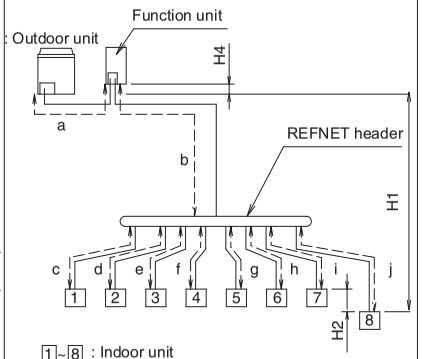
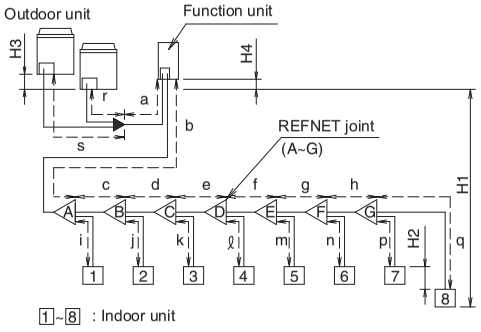
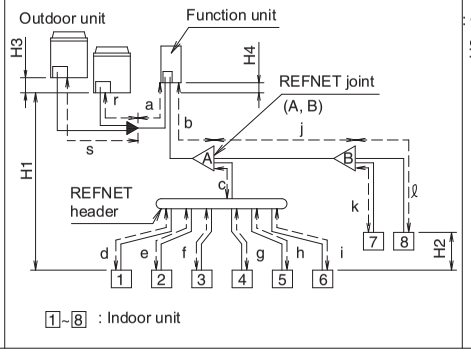
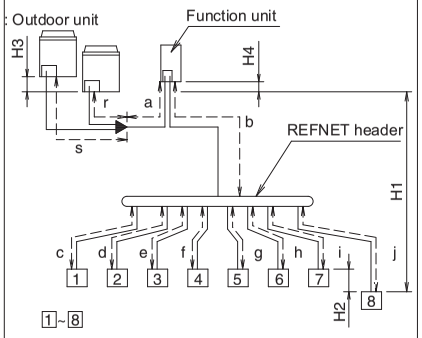
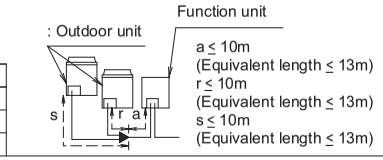
(*1) " " Indicate the Outdoor unit multi connection piping kit.
(*2) In case of multi outdoor system, re-read " outdoor unit" to "Outdoor unit multi connection piping kit" as seen from the indoor unit.

		Branch with REFNET joint	Branch with REFNET joint and header	Branch with REFNET header
Single outdoor system				
Multi outdoor system				

Maximum allowable length	Between outdoor unit (*2) and indoor unit	Actual pipe length	Pipe length between outdoor unit (*2) and indoor unit ≤ 165m		
			Example 8 : a + b + c + d + e + f + g + h + q ≤ 165m	Example 6 : a + b + c + i ≤ 165m, 8 : a + b + j + ℓ ≤ 165m	Example 8 : a + b + j ≤ 165m
		Equivalent length	Equvalent pipe length between outdoor unit (*2) and indoor unit ≤ 190m (Note 1) (Assume eqivalent pipe length of REFNET joint to be 0.5m, that of REFNET header to be 1m, that of function unit to be 6m for calculation purposes)		
		Total extention length	Total piping length from outdoor unit (*2) to all indoor unit ≤ 500m		
	Between outdoor unit and function unit Between outdoor unit and outdoor unit Multi connection piping kit	Actual and equivalent length	Actual pipe length from outdoor unit to function unit, that from first outdoor unit multi connection piping kit to outdoor unit ≤ 10m Equivalent pipe length from outdoor unit to function unit, that from first outdoor unit multi connection piping kit to outdoor unit ≤ 13m		
Allowable height difference	Between outdoor and indoor units	Difference in height	Difference in height between outdoor unit and indoor unit (H1) ≤ 50m (Max 40m if the outdoor unit is below)		
	Between indoor and indoor units	Difference in height	Difference in height between indoor units (H2) ≤ 15m		
	Between outdoor and outdoor units	Difference in height	Difference in height between outdoor units(H3) ≤ 5m		
	Between outdoor unit and function unit	Difference in height	Difference in height between outdoor unit and function unit (H4) ≤ 1m		
Allowable length after the branch		Actual Pipe Length	Actual pipe length from first refrigerant branch kit (either REFNET joint or REFNET header) to indoor unit ≤ 40m (Note2)		
			Example 8 : c + d + e + f + g + h + q ≤	Example 6 : c + i ≤ 40m 8 : j + ℓ ≤ 40m	Example 8 : j ≤ 40m

Outdoor unit multi connection piping kit and Refrigerant branch kit selection

•Refrigerant branch kits can only be used with R410A.
•When multi outdoor system are installed, be sure to use the special seperately sold Outdoor unit multi connection piping kit. (BHFQ22P1007)
(For how to select the proper kit, follow the table at right.)

How to select the REFNET joint

- When using REFNET joint at the first branch counted from the outdoor unit side,choose from the following table in accordance with the outdoor system capacity type. (Example : REFNET joint A)

Outdoor system capacity type	Refrigerant branch kit name
10HP type	KHRQ22M29T9
14~20HP type	KHRQ22M64T

- Choose the REFNET joints other than the first branch from the following table in accordance with the total capacity index of all the indoor units connected below the REFNET joint.

Indoor unit total capacity index	Refrigerant branch kit name
x < 200	KHRQ22M20T
200 ≤ x ≤ 290	KHRQ22M29T9
290 ≤ x <640	KHRQ22M64T

How to select the REFNET header

- Choose from the following table in accordance with the total capacity index of all the indoor units connected below the REFNET header.
- 250 type indoor unit can not be connected below the REFNET header.

Indoor unit total capacity index	Refrigerant branch kit name
x < 200	KHRQ22M29H*
200 ≤ x ≤ 290	KHRQ22M29H*
290 ≤ x <640	KHRQ22M64H
640 ≤ x	KHRQ22M64H

How to select the outdoor unit multi connection piping kit (This is required when the system is multi outdoor unit system.)

- Choose from the following table in accordance with the number of outdoor units.

Number of outdoor unit	Connecting piping kit name
2 units	BHFQ22P1007

Example for indoor units connected downstream

Example REFNET joint C : Indoor units 3 + 4 + 5 + 6 + 7 + 8

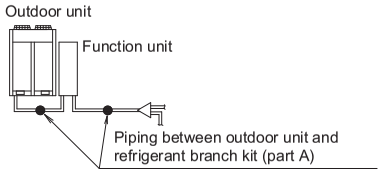
Example REFNET joint B : Indoor units 7 + 8
Example REFNET header : Indoor units 1 + 2 + 3 + 4 + 5 + 6

Example REFNET header :
Indoor units 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8

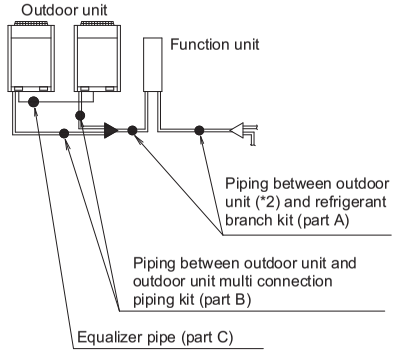
Pipe size selection

The thickness of the pipes in the table shows the requirements of Japanease High Pressure Gas Controll low. (As of Jan.2003)
the thickness and material shall be selected in accordance with local code.

In case of single outdoor unit system



In case of multi outdoor unit system



Piping between outdoor unit (*2) and refrigerant branch kit (part A)

- Choose from the following table in accordance with the outdoor unit system capacity type.

(Unit:mm)

Outdoor system capacity type	Piping size (O. D.)	
	Gas pipe	Liquid pipe
10HP type	Ø22.2	Ø9.5
14, 16HP type	Ø28.6	Ø12.7
20HP type		Ø15.9

Piping between outdoor unit multi connection piping kit and outdoor unit (part B)

- Choose from the following table in accordance with the capacity type of the outdoor unit connected

(Unit:mm)

Outdoor system capacity type	Piping size (O. D.)	
	Gas pipe	Liquid pipe
RTSP8 type	Ø22.2	Ø9.5
RTSP8 type	Ø28.6	Ø12.7

Piping between refrigerant branch kits

- Choose from the following table in accordance with the total capacity type of all the indoor units connected downstream.
- Do not let the connection piping exceed the main refrigerant piping size (Part A). If the piping size selected from the following table exceeds the piping size of part A, decide the piping size in either of the following methods.
(1)Reduce the size of the connection piping to the piping size of part A.
(2)Replace the piping of part A with piping that is a size larger (see the table in Note 1) so that it will be the same as the size of the connection piping.

(Unit:mm)

Indoor capacity index	Piping size (O. D.)	
	Gas pipe	Liquid pipe
x < 150	Ø15.9	Ø9.5
150 ≤ x < 200	Ø19.1	
200 ≤ x < 290	Ø22.2	
290 ≤ x < 420	Ø28.6	Ø12.7
420 ≤ x < 640		Ø15.9

Piping between refrigerant branch kit, and indoor unit

- Match to the size of the connection piping on the indoor unit.

Indoor unit capacity type	Piping size (O. D.)	
	Gas pipe	Liquid pipe
20•25•32•40•50 type	Ø12.7	Ø6.4
63•80•100•125 type	Ø15.9	Ø9.5
200 type	Ø19.1	
250 type	Ø22.2	

Equalizer pipe (part D) (multi outdoor unit system only)

(Unit:mm)

Piping size (O. D.)
Ø19.1

Temper grade and wall thickness for pipes

(Temper grade, O type and 1/2H type indicate the material type specified in JIS H 3300.)

Copper tube O. D.	Ø6.4	Ø9.5	Ø12.7	Ø15.9	Ø19.1	Ø22.2	Ø25.4	Ø28.6	Ø31.8	Ø34.9	Ø38.1	Ø41.3
Temper grade	O type								1/2H type			
Wall thickness (Min. requirement)	0.80	0.80	0.80	0.99	0.80	0.80	0.88	0.99	1.10	1.21	1.32	1.43

6 Refrigerant pipe selection

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How to calculate the additional refrigerant to be charged

Additional refrigerant to be charged : R(kg)
(R should be rounded off in units of 0.1 kg.)

$$R = \left(\begin{array}{l} (\text{Total length (m) of liquid piping size at } \phi 22.2) \times 0.37 + (\text{Total length (m) of liquid piping size at } \phi 19.1) \times 0.26 \\ + (\text{Total length (m) of liquid piping size at } \phi 15.9) \times 0.18 + (\text{Total length (m) of liquid piping size at } \phi 12.7) \times 0.12 \\ + (\text{Total length (m) of liquid piping size at } \phi 9.5) \times 0.059 + (\text{Total length (m) of liquid piping size at } \phi 6.4) \times 0.022 \end{array} \right) + \alpha$$

FOR THE SYSTEM	
SYSTEM NAME	THE AMOUNT OF REFRIGERANT
RTSYQ10PY1	—
RTSYQ14PY1	1.3kg
RTSYQ16PY1	2.3kg
RTSYQ20PY1	—

Example for refrigerant branch using REFNET joint and REFNET header for the systems and each pipe length as shown below.

System: RTSYQ20PY1

Independant outdoor unit: RTSQ8PY1, RTSQ12PY1

Function unit: BTSQ20PY1

a : ϕ15.9 × 10m	e : ϕ6.4 × 10m	i : ϕ6.4 × 10m	r : ϕ12.7 × 5m
b : ϕ15.9 × 30m	f : ϕ6.4 × 20m	j : ϕ9.5 × 20m	s : ϕ9.5 × 10m
c : ϕ12.7 × 20m	g : ϕ6.4 × 20m	k : ϕ9.5 × 10m	
d : ϕ6.4 × 10m	h : ϕ6.4 × 10m	ℓ : ϕ9.5 × 10m	

$$R = \underbrace{40 \times 0.18}_{a,\,b} + \underbrace{25 \times 0.12}_{c,\,r} + \underbrace{50 \times 0.059}_{j,\,k,\,\ell,\,s} + \underbrace{80 \times 0.022}_{d\sim i} = 14.91 \Longrightarrow \boxed{14.9kg}$$

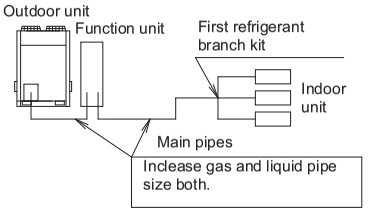
Round off in units of 0.1k g

Note 1.

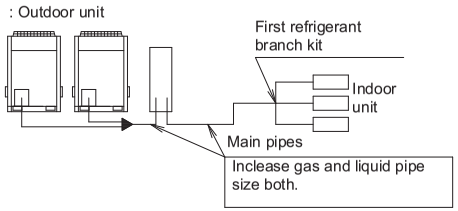
When the equivalent length between outdoor (*2) and indoor units is 90m or more, the size of main pipes (figure on right) must be increased according to the right table.

System	Gas	Liquid
RTSYQ10 type	ϕ22.2 → ϕ25.4 (*)	ϕ9.5 → ϕ12.7
RTSYQ14 type	Not increased	ϕ12.7 → ϕ15.9
RTSYQ16 type	ϕ28.6 → ϕ31.8 (*)	
RTSYQ20 type		ϕ15.9 → ϕ19.1

*If available on the site , use this size.
Otherwise, it can not be increased.

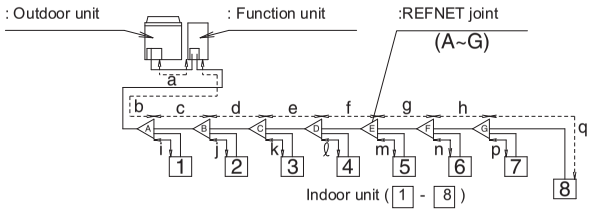


: In case of single outdoor unit system



: In case of multi outdoor unit system

Note 2. Allowable length after the first refrigerant branch kit to indoor units is 40m or less, however it can be extended up to 90m if all the following conditions are satisfied.

Required Conditions	Example Drawings (In case of "**Branch with REFNET joint**")	
1. It is necessary to increase the pipe size between the first branch kit and the final branch kit. (Reducers must be procured on site) However, the pipes that are same pipe size with main pipe must not be increased.	[8] c+d+e+f+g+h+q≤ 90 m Increase the pipe size of c, d, e , f ,g, h	: Increase the pipe size as follows. ϕ 9.5 → ϕ12.7 ϕ15.9 → ϕ19.1 ϕ22.2 → ϕ25.4* ϕ34.9 → ϕ38.1* ϕ12.7 → ϕ15.9 ϕ19.1 → ϕ22.2 ϕ28.6 → ϕ31.8*
2. For calculation of Total extension length, the actual length of above pipes must be doubled. (except main pipe and the pipes are not increased).	a+b+c×2+d×2+e×2+f×2+g×2 +h×2+i+j+k+ℓ+m+n+p+q≤ 500 m	
3. Indoor unit to the nearest branch kit ≤ 40m	i, j..... p, q ≤ 40 m	
4. The difference between [Outdoor unit to the farthest indoor unit] and [Outdoor unit to the nearest indoor unit] ≤ 40m	The farthest indoor unit [8] The nearest indoor unit [1] (a+b+c+d+e+f+g+h+q)-(a+b+i)≤ 40 m	

*If available on the site , use this size. Otherwise it can not be increased.

6 Refrigerant pipe selection

6 - 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.

Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.

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The present publication supersedes EEDEN09-203
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