






## 1-7. Straight Equivalent Length of Joints

Design the tubing system by referring to the following table for the straight equivalent length of joints.

**Table 1-7 Straight Equivalent Length of Joints**

Gas tubing size (mm)		12.7	15.88	19.05	22.22	25.4	28.58	31.8	38.1
90° elbow		0.30	0.35	0.42	0.48	0.52	0.57	0.70	0.79
45° elbow		0.23	0.26	0.32	0.36	0.39	0.43	0.53	0.59
U-shape tube bent (R60-100 mm)		0.90	1.05	1.26	1.44	1.56	1.71	2.10	2.37
Trap bend		2.30	2.80	3.20	3.80	4.30	4.70	5.00	5.80
Y-branch distribution joint		Equivalent length conversion not needed.							
Ball valve for service		Equivalent length conversion not needed.							

**Table 1-8 Refrigerant tubing**

Tubing size (mm)			
Material O		Material 1/2H • H	
ø6.35	t0.8	ø22.22	t1.0
ø9.52	t0.8	ø25.4	t1.0
ø12.7	t0.8	ø28.58	t1.0
ø15.88	t1.0	ø31.75	t1.1
ø19.05	t1.2	ø38.1	over t1.35
		ø41.28	over t1.45

\* When bending the tubes, use a bending radius that is at least 4 times the outer diameter of the tubes.  
In addition, take sufficient care to avoid crushing or damaging the tubes when bending them.

## 1-8. Additional Refrigerant Charge

Additional refrigerant charge amount is calculated below.

Required amount of additional refrigerant charge = [ (Amount of additional refrigerant charge per meter of each size of liquid tube × its tube length) + (...) + (...)] + [(Necessary amount of additional refrigerant charge per outdoor unit) + (...) + (...)]

\*Always charge accurately using a scale for weighing.

\*If the existing tubing is used and the amount of on-site refrigerant charge exceeds the value listed below, change the size of the tubing to reduce the amount of refrigerant.

Total amount of refrigerant for the system with 1 outdoor unit: 50 kg

Total amount of refrigerant for the system with 2 outdoor units: 80 kg

Total amount of refrigerant for the system with 3 outdoor units: 100 kg

**Table 1-9-1 Amount of Additional Refrigerant Charge Per Meter, According to Liquid Tubing Size**

Liquid tubing size	6.35	9.52	12.7	15.88	19.05	22.22	25.4
Amount of additional refrigerant charge/m (g/m)	26	56	128	185	259	366	490

**Table 1-9-2 Necessary Amount of Additional Refrigerant Charge Per Outdoor Unit**

U-8ME1E81	U-10ME1E81	U-12ME1E81	U-14ME1E81	U-16ME1E81	U-18ME1E81	U-20ME1E81
5.9 kg	6.6 kg	6.6 kg	7.8 kg	7.8 kg	8.5 kg	8.5 kg

**Table 1-10 Refrigerant Charge Amount at Shipment (for Outdoor Unit)**

U-8ME1E81	U-10ME1E81	U-12ME1E81	U-14ME1E81	U-16ME1E81	U-18ME1E81	U-20ME1E81
6.5 kg	6.8 kg	6.8 kg	8.5 kg	8.5 kg	9.0 kg	9.0 kg

## 1-9. System Limitations

**Table 1-11 System Limitations**

Max. No. allowable connected outdoor units	3 *2
Max. capacity allowable connected outdoor units	168 kW (60 hp)
Max. connectable indoor units	64 *1
Max. allowable indoor/outdoor capacity ratio	50 – 200 % *3

\*1: In the case of 22 hp (type 61.5 kW) or smaller units, the number is limited by the total capacity of the connected indoor units.

\*2: Up to 3 units can be connected if the system has been extended.

\*3: It is strongly recommended that you choose the unit so the load can become between 50 and 130%.