

## 6. Refrigerant Piping

### Note

- All field piping must be installed by a licensed refrigeration technician and must comply with relevant local and national regulations.
- After piping work is complete, do not under any circumstances open the shutoff valve until “7. Field Wiring” and “10. Checking of Device and Installation Conditions” are complete.
- Do not use flux when brazing the refrigerant piping. Use the phosphor copper brazing filler metal (BCuP-2: JIS Z 3264/B-Cu93P-710/795: ISO 3677) which does not require flux.  
(Flux has extremely harmful influence on refrigerant piping systems. For instance, if the chlorine based flux is used, it will cause pipe corrosion or, in particular, if the flux contains fluorine, it will damage the refrigerant oil.)

### 6.1 Selection of Piping Material and Refrigerant Branching Kit

- Use only pipes which are clean inside and outside and which do not accumulate harmful sulfur, oxidants, dirt, cutting oils, moisture, or other contamination. (Foreign materials inside pipes including oils for fabrication must be 30mg/10m or less.)
- Use the following items for the refrigerant piping.

**Material:** Joint less phosphor-deoxidized copper pipe

**Size:** See “6-5 Example of Connection” to determine the correct size.

**Thickness:** Select a thickness for the refrigerant piping which complies with national and local laws.

For R-410A, the design pressure is 4.0 MPa (40-bar).

The minimum thickness of piping according to Japan’s High-Pressure Gas Safety Law (as of January 2003) is shown below.

Types (O type, 1/2H type) in the table indicate the material types specified in JIS H 3300.

(unit: mm)

Temper grade	O type			
outer diameter	φ6.4	φ9.5	φ12.7	φ15.9
smallest thickness	0.80	0.80	0.80	0.99

(unit: mm)

Temper grade	1/2H type							
outer diameter	φ19.1	φ22.2	φ25.4	φ28.6	φ31.8	φ34.9	φ38.1	φ41.3
smallest thickness	0.80	0.80	0.88	0.99	1.10	1.21	1.32	1.43

- For piping work, follow the maximum tolerated length, difference in height, and length after a branch indicated in the “6-5 Example of connection”.
- A refrigerant branching kit (sold separately) is needed for piping branches and connection of piping between outdoor unit (in case of multi system).  
Use only separately sold items selected specifically according to the refrigerant branch kit selection in the “6-5 Example of connection”.

### 6.2 Protection Against Contamination when Installing Pipes

Protect the piping to prevent moisture, dirt, dust, etc. from entering the piping.

Place	Installation period	Protection method
Outdoor	More than a month	Pinch the pipe
	Less than a month	
Indoor	Regardless of the period	Pinch or tape the pipe

### Note

Exercise special caution to prevent dirt or dust when passing piping through holes in walls and when passing pipe edges to the exterior.

### 6.3 Pipe Connection

- Be sure to perform nitrogen permutation or nitrogen blow when brazing. **(Refer to next figure)**  
Brazing without performing nitrogen permutation or nitrogen blow into the piping will create large quantities of oxidized film on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal operation.