



# TOSHIBA

**AIR CONDITIONER (SPLIT TYPE)**

## Installation manual

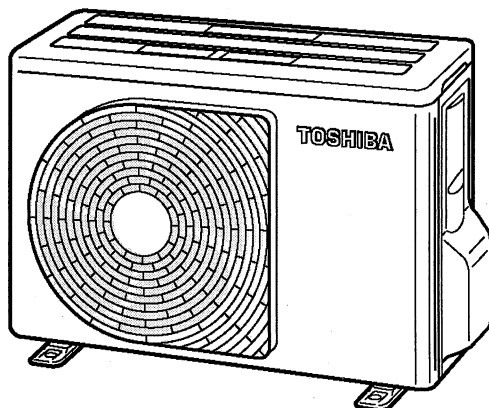


### Outdoor Unit

Model name:

**RAV-SP404AT-E      RAV-SP454AT-E**  
**RAV-SP404ATZ-E      RAV-SP454ATZ-E**  
**RAV-SP404ATZG-E      RAV-SP454ATZG-E**

Not accessible to the general public  
Vente interdite au grand public  
Kein öffentlicher Zugang  
Non accessibile a clienti generici  
No destinado al público en general  
Não acessível ao público em geral  
Niet geschikt voor huishoudelijk gebruik  
Μη προσβάσιμο από το γενικό κοινό  
Недоступен для посторонних  
Genel erişime açık değildir



Installation manual Air conditioner (Split type)	1	English
Manuel d'installation Climatiseur (Type split)	21	Français
Installations-handbuch Klimagerät (Split-typ)	41	Deutsch
Manuale di installazione Condizionatore d'aria (Tipo split)	61	Italiano
Manual de instalación Aire acondicionado (Tipo split)	81	Español
Manual de Instalação Ar condicionado (Tipo split)	101	Português
Installatiehandleiding Airconditioner (Gesplitst type)	121	Nederlands
Εγχειρίδιο εγκατάστασης Κλιματιστικό (Τύπου Split)	141	Ελληνικά
Руководство по установке Кондиционер воздуха (сплит-система)	161	Русский
Montaj Kılavuzu Klima (Split tip)	181	Türkçe

Please read this Installation Manual carefully before installing the Air Conditioner.

- This Manual describes the installation method of the outdoor unit.
- For installation of the indoor unit, follow the Installation Manual attached to the indoor unit.

### **ADOPTION OF NEW REFRIGERANT**

This Air Conditioner is a new type which adopts a new refrigerant HFC (R410A) instead of the conventional refrigerant R22 in order to prevent destruction of the ozone layer.

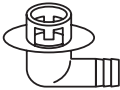

# **Contents**

---

<b>1</b>	<b>ACCESSORY AND REFRIGERANT .....</b>	<b>2</b>
<b>2</b>	<b>PRECAUTIONS FOR SAFETY .....</b>	<b>3</b>
<b>3</b>	<b>INSTALLATION OF NEW REFRIGERANT AIR CONDITIONER .....</b>	<b>5</b>
<b>4</b>	<b>SELECTION OF INSTALLATION .....</b>	<b>6</b>
<b>5</b>	<b>REFRIGERANT PIPING.....</b>	<b>10</b>
<b>6</b>	<b>AIR PURGING.....</b>	<b>12</b>
<b>7</b>	<b>ELECTRICAL WORK .....</b>	<b>14</b>
<b>8</b>	<b>EARTHING .....</b>	<b>15</b>
<b>9</b>	<b>FINISHING .....</b>	<b>15</b>
<b>10</b>	<b>TEST RUN.....</b>	<b>15</b>
<b>11</b>	<b>FUNCTIONS TO BE IMPLEMENTED LOCALLY .....</b>	<b>16</b>
<b>12</b>	<b>APPLICABLE CONTROL OF OUTDOOR UNIT .....</b>	<b>17</b>
<b>13</b>	<b>APPENDIX .....</b>	<b>18</b>

# 1 ACCESSORY AND REFRIGERANT

## ■ Accessory Parts

Part name	Q'ty	Shape	Usage
Outdoor unit Installation manual	1	This manual	(Hand this directly to the customer.)
Drain nipple	1		
Waterproof rubber cap	2		

## ■ Refrigerant Piping

- Piping kit used for the conventional refrigerant cannot be used.
- Use copper pipe with 0.8 mm or more thickness for Ø6.4 mm, Ø12.7 mm.
- Flare nut and flare works are also different from those of the conventional refrigerant.  
Take out the flare nut attached to the air conditioner, and use it.

En

# 2 PRECAUTIONS FOR SAFETY

---

- Ensure that all Local, National and International regulations are satisfied.
- Read this “PRECAUTIONS FOR SAFETY” carefully before Installation.
- The precautions described below include the important items regarding safety. Observe them without fail.
- After the installation work, perform a trial operation to check for any problem.  
Follow the Owner’s Manual to explain how to use and maintain the unit to the customer.
- Turn off the main power supply switch (or breaker) before the unit maintenance.
- Ask the customer to keep the Installation Manual together with the Owner’s Manual.

---

## WARNING

---

- **Ask an authorized dealer or qualified installation professional to install/maintain the air conditioner.**  
Inappropriate installation may result in water leakage, electric shock or fire.
  - **Be sure to connect earth wire. (grounding work)**  
Incomplete grounding cause an electric shock.  
Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone wires.
  - **Turn off the main power supply switch or breaker before attempting any electrical work.**  
Make sure all power switches are off. Failure to do so may cause electric shock.  
Use an exclusive power circuit for the air conditioner. Use the rated voltage.
  - **Connect the connecting wire correctly.**  
If the connecting wire is connected in a wrong way, electric parts may be damaged.
  - **When moving the air conditioner for the installation into another place, be very careful not to enter any gaseous matter other than the specified refrigerant into the refrigeration cycle.**  
If air or any other gas is mixed in the refrigerant, the gas pressure in the refrigeration cycle becomes abnormally high and it may resultingly causes pipe burst and injuries on persons.
  - **Do not modify this unit by removing any of the safety guards or by by-passing any of the safety interlock switches.**
  - **After unpacking the unit, examine it carefully if there are possible damage.**
  - **Do not install in a place that might increase the vibration of the unit.**
  - **To avoid personal injury (with sharp edges), be careful when handling parts.**
  - **Perform installation work properly according to the Installation Manual.**  
Inappropriate installation may result in water leakage, electric shock or fire.
  - **When the air conditioner indoor unit is installed in a small room, provide appropriate measures to ensure that the concentration of refrigerant leakage occur in the room does not exceed the critical level.**
  - **Tighten the flare nut with a torque wrench in the specified manner.**  
Excessive tightening of the flare nut may cause a crack in the flare nut after a long period, which may result in refrigerant leakage.
  - **Wear heavy gloves during the installation work to avoid injury.**
  - **Install the air conditioner securely in a location where the base can sustain the weight adequately.**
  - **Perform the specified installation work to guard against an earthquake.**  
If the air conditioner is not installed appropriately, accidents may occur due to the falling unit.
  - **If refrigerant gas has leaked during the installation work, ventilate the room immediately.**  
If the leaked refrigerant gas comes in contact with fire, noxious gas may generate.
  - **After the installation work, confirm that refrigerant gas does not leak.**  
If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas might generate.
  - **Electrical work must be performed by a qualified electrician in accordance with the Installation Manual. Make sure the air conditioner uses an exclusive power supply.**  
An insufficient power supply capacity or inappropriate installation may cause fire.
  - **Use the specified wires for wiring connect the terminals securely fix.**  
**To prevent external forces applied to the terminals from affecting the terminals.**
-

---

 **WARNING**

---

- **Conform to the regulations of the local electric company when wiring the power supply.**  
Inappropriate grounding may cause electric shock.
  - **Do not install the air conditioner in a location subject to a risk of exposure to a combustible gas.**  
If a combustible gas leaks, and stays around the unit, a fire may occur.
  - **Install the refrigerant pipe securely during the installation work before operating the air conditioner.**  
If the compressor is operated with the valve open and without the refrigerant pipe, the compressor sucks air and the refrigeration cycle is overpressurized, which may cause a burst or injury.
  - **For the refrigerant recovery work (collection of refrigerant from the pipe to the compressor), stop the compressor before disconnecting the refrigerant pipe.**  
If the refrigerant pipe is disconnected while the compressor is working with the valve open, the compressor sucks air and the refrigeration cycle is overpressurized, which may cause a burst or injury.
- 

 **CAUTION**

---

#### **New Refrigerant Air Conditioner Installation**

- **THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT (R410A) WHICH DOES NOT DESTROY OZONE LAYER.**
- The characteristics of R410A refrigerant are ; easy to absorb water, oxidizing membrane or oil, and its pressure is approx. 1.6 times higher than that of refrigerant R22. Accompanied with the new refrigerant, refrigerating oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating oil does not enter the refrigerating cycle.
- To prevent charging an incorrect refrigerant and refrigerating oil, the sizes of connecting sections of charging port of the main unit and installation tools are changed from those for the conventional refrigerant.
- Accordingly the exclusive tools are required for the new refrigerant (R410A).
- For connecting pipes, use new and clean piping designed for R410A, and please care so that water or dust does not enter.

#### **To Disconnect the Appliance from Main Power Supply**

- This appliance must be connected to the main power supply by means of a switch with a contact separation of at least 3 mm.
  - The installation fuse 16 A (All type fuse can be used) must be used for the power supply line of this conditioner.
-

# 3 INSTALLATION OF NEW REFRIGERANT AIR CONDITIONER

This air conditioner is a new type which adopts a new refrigerant HFC (R410A) to prevent depletion of the ozone layer.

- The R410A refrigerant is more susceptible to impurities such as water, oxide membrane, oils, and fats.

With the adoption of the new refrigerant, refrigerating oil has also been changed.

Be careful so that water, dust, conventional refrigerant, and/or conventional refrigerating oil do not enter the refrigerating cycle of the new refrigerant air conditioner.

- To prevent different refrigerant or refrigerating oil being mixed, the sizes of the charging port of the unit and the installation tool connecting sections are different from the conventional refrigerant.

Accordingly the following exclusive tools are required for the new refrigerant R410A.

- Use new and clean piping materials for connecting pipes, and connect pipes while preventing water or dust from entering.

## ■ Required Tools/Equipment and Precautions for Use

Prepare the tools and equipment listed in the following table before starting installation work.

Newly prepared tools and equipment must be used exclusively.

### Legend

○ : Prepared newly (Use for R410A only. Do not use for refrigerant R22 or R407C etc..)

⊙ : Conventional tools/equipment are available

Tools/equipment	Use	How to use tools/equipment
Gauge manifold	Vacuuming/charging refrigerant and operation check	○ Prepared newly for R410A only
Charging hose		○ Prepared newly for R410A only
Charging cylinder	Can not be used	Unusable (Use the refrigerant charging measure instead.)
Gas leak detector	Gas leak check	○ Prepared newly
Vacuum pump with backflow prevention function	Vacuum drying	Unusable
Vacuum pump with backflow prevention function	Vacuum drying	⊙ R22
Flare tool	Flare machining of pipes	⊙ Usable if dimensions are adjusted.
Bender	Bending pipes	⊙ R22
Refrigerant recovery equipment	Refrigerant recovery	○ For R410A only
Torque wrench	Tightening flare nuts	○ Exclusive for Ø12.7 mm
Pipe cutter	Cutting pipes	⊙ R22
Refrigerant cylinder	Charging refrigerant	○ For R410A only Discriminated by the refrigerant name on the cylinder.
Welding machine and nitrogen cylinder	Welding pipes	⊙ R22
Refrigerant charging measure	Charging refrigerant	⊙ R22

## ■ Refrigerant Piping

### New refrigerant (R410A)

#### When using the conventional piping kit

- When using the conventional piping kit that has no indication of applicable refrigerant types, be sure to use it with a wall thickness of 0.8 mm for Ø6.4 mm and Ø12.7 mm.

#### When using general copper pipes

- Use general copper pipes with a wall thickness of 0.8 mm for Ø6.4 mm and Ø12.7 mm, with a limit of internal adhering oil amount of 40 g/10 m or less.

#### Flare nuts and flare machining

- The flare nuts and flare machining are different from those for the conventional refrigerant.  
Use the flare nuts supplied with the air conditioner or those for R410A.
  - Before performing flare machining, carefully read “REFRIGERANT PIPING”.

# 4 SELECTION OF INSTALLATION

## ■ Before installation

Be careful to the following items before installation.

### Length of refrigerant pipe

Length of refrigerant pipe connected to indoor/outdoor unit	Item
5 m to 20 m	Addition of refrigerant is unnecessary at the local site.
*21 m to 30 m	<Addition of refrigerant> Add 20 g of refrigerant for every 1m of pipe which exceeds 20 m.

#### \* Caution at addition of refrigerant

When the total length of refrigerant pipe exceeds 20 m, add 20 g /m of refrigerant and the maximum total length of pipe is 30 m.

(Max. amount of additional refrigerant is 200 g.)

Charge the refrigerant accurately. Overcharge may cause a serious trouble of compressor.

#### \* Do not connect a refrigerant pipe shorter than 5 m.

This may cause a malfunction of the compressor or other devices.

### Airtight test

1. Before starting an airtight test, further tighten the spindle valves on the gas side and liquid side.
2. Pressurize the pipe with nitrogen gas charged from the service port to the design pressure (4.15 Mpa) to conduct the airtight test.
3. Check gas leak using a leak tester for HFC refrigerant.
4. After the airtight test is completed, evacuate the nitrogen gas.

### Air purge

- For air purge, use a vacuum pump.
- Do not use refrigerant charged in the outdoor unit for air purge. (The refrigerant for air purge is not contained in the outdoor unit.)

### Electrical wiring

- Be sure to fix the power wires and indoor/outdoor connecting wires with clamps so that they do not contact with the cabinet, etc.

### Earthing



#### **Make sure that proper earthing is provided.**

Improper earthing may cause electric shock.

For how to check earthing, contact the dealer who installed the air conditioner or a professional installation company.

- Proper earthing can prevent charging of electricity on the outdoor unit surface due to high frequency of the frequency converter (inverter) in the outdoor unit, as well as prevent electric shock.  
If the outdoor unit is not properly earthed, you may feel electric shock.
- Earthing is also necessary for reducing noise.

### Test Run

Turn on the leakage breaker at least 12 hours before starting a test run to protect the compressor during startup.



Incorrect work may result in a malfunction or complaints of customers.

# 4 SELECTION OF INSTALLATION

## ■ Installation Place

### WARNING

**Install the outdoor unit properly at a place that is durable enough to the weight of the outdoor unit.**

Insufficient durability may cause the outdoor unit to fall, which may result in injury.

### CAUTION

**Do not install the outdoor unit at a place subject to combustible gas leak.**

Accumulation of combustible gas around the outdoor unit may cause a fire.

**Install the outdoor unit at a place that meets the following conditions after customer's consent is obtained.**

- A well-ventilated place free from obstacles near the air inlets and air outlet
- A place that is not exposed to rain or direct sunlight
- A place that does not increase the operating noise or vibration of the outdoor unit
- A place that does not cause any drainage problem with discharged water

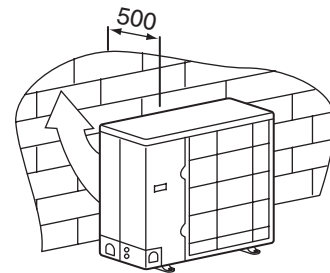
**Do not install the outdoor unit at the following places.**

- A place full of saline atmosphere (coastal area) or sulfide gas (hot-spring area)  
(Special maintenance is required.)
- A place subject to oil, vapor, oily smoke, or corrosive gas
- A place where organic solvent is used
- A place where high-frequency equipment (including inverter equipment, private power generator, medical equipment, and communication equipment) is used (Installation in this place may cause malfunction of the air conditioner, abnormal control or problems due to noise to such equipment.)
- A place where the discharged air of the outdoor unit blows against the window of the neighbors.
- A place where the operating noise of the outdoor unit is transmitted
- When the outdoor unit is installed in an elevated position, be sure to secure its feet.
- A place where the drain water does not make any problem.

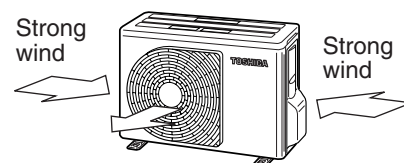
### CAUTION

1. Install the outdoor unit at a place where discharge air is not blocked.
2. When an outdoor unit is installed in a place that is always exposed to a strong wind like a coast or on a high storey of a building, secure a normal fan operation by using a duct or a wind shield.
3. When installing the outdoor unit in a place that is constantly exposed to a strong wind such as the upper stairs or rooftop of a building, apply the windproof measures referring to the following examples.

- 1) Install the unit so that its discharge port faces to the wall of the building.  
Keep a distance 500 mm or more between the unit and the wall surface.

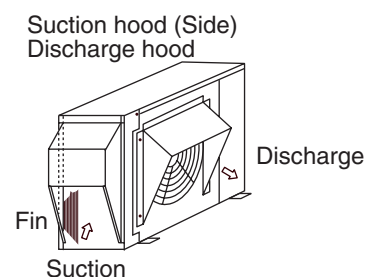


- 2) Supposing the wind direction during the operation season of the air conditioner, install the unit so that the discharge port is set at right angle to the wind direction



- When using an air conditioner under low outside temperature condition (Outside temp.:  $-5^{\circ}\text{C}$  or lower) with COOL mode, prepare a duct or wind shield so that it is not affected by the wind.

### <Example>





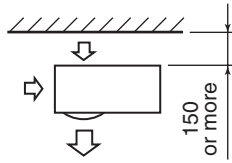
# Necessary Space for Installation

(Unit: mm)

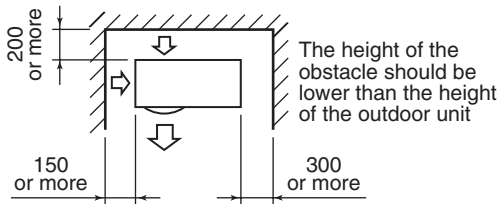
## Obstacle at rear side

### ◆ Upper side is free

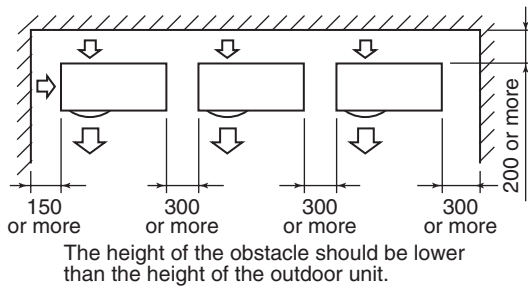
1. Single unit installation



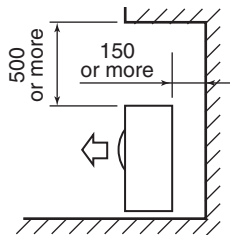
2. Obstacles at both right and left sides.



3. Serial installation of two or more units



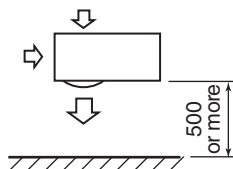
### ◆ Obstacle also at the upper side



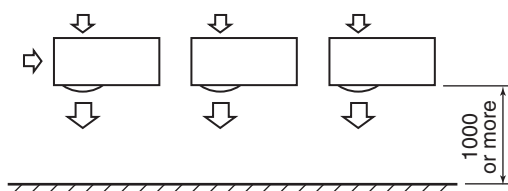
## Obstacle at front side

### ◆ Upper side is free

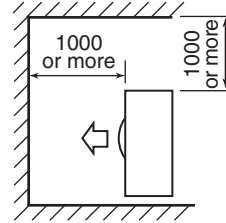
1. Single unit installation



2. Serial installation of two or more units



### ◆ Obstacle also at the upper side

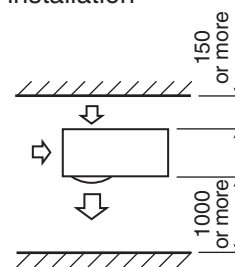


## Obstacles at both front and rear sides

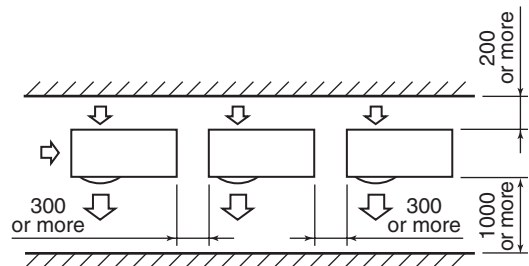
Open the upper side and both right and left sides. The height of obstacle at both front and rear side, should be lower than the height of the outdoor unit.

### ◆ Standard installation

1. Single unit installation



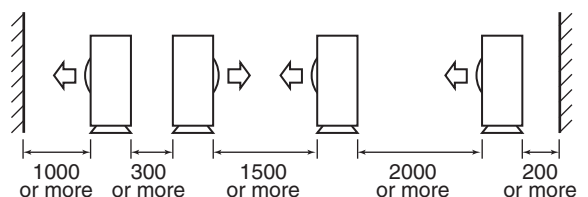
2. Serial installation of two or more units



## Serial installation at front and rear sides

Open the upper side and both right and left sides. The height of obstacle at both front and rear sides should be lower than the height of the outdoor unit.

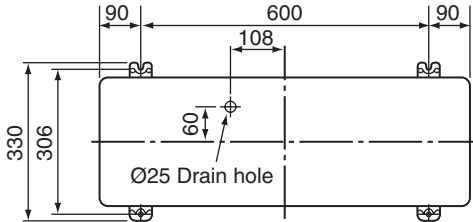
### ◆ Standard installation



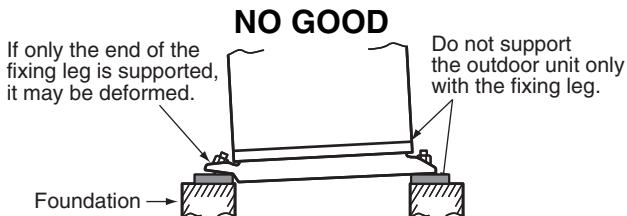
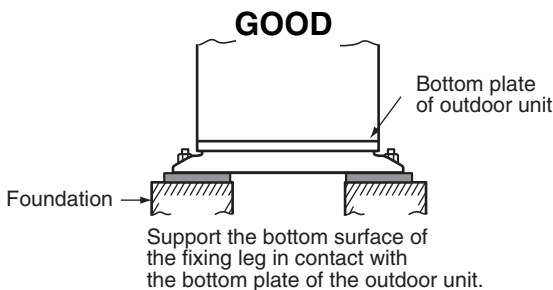
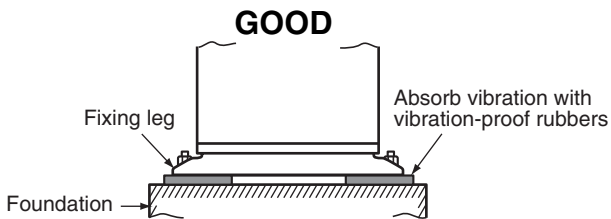
# 4 SELECTION OF INSTALLATION

## ■ Installation of Outdoor Unit

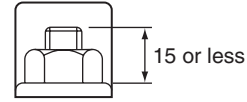
- Before installation, check strength and horizontality of the base so that abnormal sound does not generate.
- According to the following base diagram, fix the base firmly with the anchor bolts.  
(Anchor bolt, nut: M10 × 4 pairs)



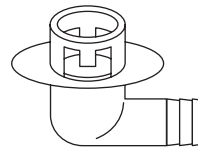
- As shown in the figure below, install the foundation and vibration-proof rubbers to directly support the bottom surface of the fixing leg that is in contact with the bottom plate of the outdoor unit.
- \* When installing the foundation for an outdoor unit with downward piping, consider the piping work.



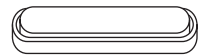
Set the out margin of the anchor bolt to 15 mm or less.



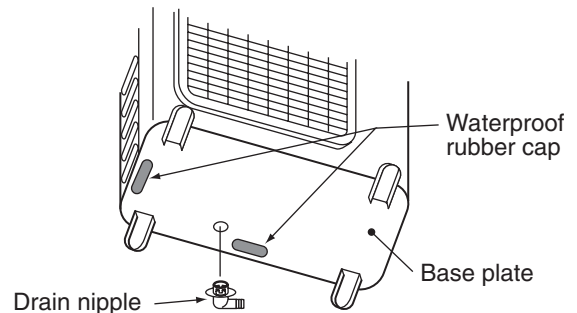
- In case of draining through the drain hose, attach the following drain nipple and the waterproof rubber cap, and use the drain hose (Inner diam.: 16 mm) sold on the market. And also seal the screws securely with silicone material, etc. so that water does not drop down. Some conditions may cause dewing or dripping of water.
- When collectively draining discharged water completely, a drain pan must be made locally.



Drain nipple



Waterproof rubber cap (2pcs.)



## ■ For Reference

If a heating operation would be continuously performed for a long time under the condition that the outdoor temperature is 0 °C or lower, draining of defrosted water may be difficult due to freezing of the bottom plate, resulting in a trouble of the cabinet or fan.

It is recommended to procure an anti-freeze heater locally for a safety installation of the air conditioner.

For details, contact the dealer.

# 5 REFRIGERANT PIPING

## ■ Optional Installation Parts (Local Procure)

	Parts name	Q'ty
A	Refrigerant piping Liquid side : $\text{Ø}6.4$ mm Gas side : $\text{Ø}12.7$ mm	Each one
B	Pipe insulating material (polyethylene foam, 6 mm thick)	1
C	Putty, PVC tapes	Each one

## ■ Refrigerant Piping Connection

### CAUTION

#### TAKE NOTICE THESE IMPORTANT 4 POINTS BELOW FOR PIPING WORK

1. Keep dust and moisture away from inside the connecting pipes.
2. Tightly connect the connection between pipes and the unit.
3. Evacuate the air in the connecting pipes using VACUUM PUMP.
4. Check gas leak at connected points.

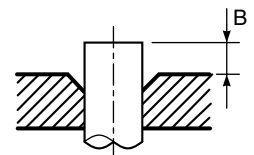
Insert a flare nut into the pipe, and flare the pipe.

As the flaring sizes of R410A differ from those of refrigerant R22, the flare tools newly manufactured for R410A are recommended.

However, the conventional tools can be used by adjusting projection margin of the copper pipe.

#### ◆ Projection margin in flaring : B (Unit : mm)

Rigid (Clutch type)

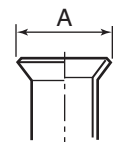


Outer diam. of copper pipe	R410A tool used	Conventional tool used
	R410A	R410A
6.4	0 to 0.5	1.0 to 1.5
12.7		

#### ◆ Piping connection

Liquid side		Gas side	
Outer diameter	Thickness	Outer diameter	Thickness
$\text{Ø}6.4$ mm	0.8 mm	$\text{Ø}12.7$ mm	0.8 mm

#### ◆ Flaring diam. meter size : A (Unit : mm)



Outer diam. of copper pipe	A+0, A-0.4
	R410A
6.4	9.9
12.7	16.6

### Flaring

1. Cut the pipe with a pipe cutter.  
Be sure to remove burrs that may cause gas leak.
2. Insert a flare nut into the pipe, and then flare the pipe.  
Use the flare nuts supplied with the air conditioner or those for R410A.

\* In case of flaring for R410A with the conventional flare tool, pull it out approx. 0.5 mm more than that for R22 to adjust to the specified flare size.

The copper pipe gauge is useful for adjusting projection margin size.

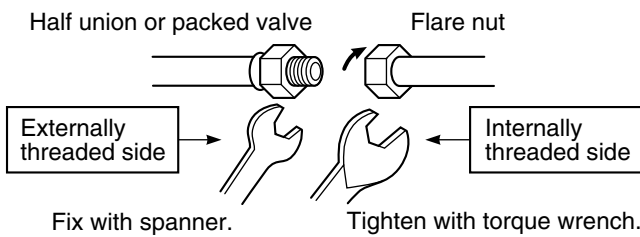
# 5 REFRIGERANT PIPING

## ■ Tightening of Connecting Part

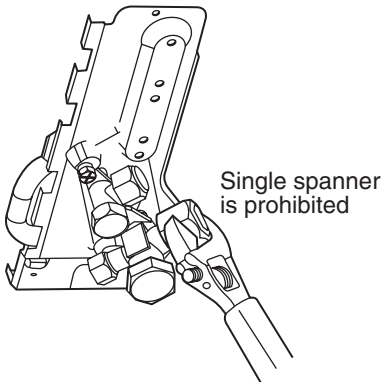
1. Align the centers of the connecting pipes and fully tighten the flare nut with fingers. Then fix the nut with a spanner as shown in the figure and tighten it with a torque wrench.
2. As shown in the figure, be sure to use two spanners to loosen or tighten the flare nut of the valve on the gas side. If you use a single spanner, the flare nut cannot be tightened to the required tightening torque. On the other hand, use a single spanner to loosen or tighten the flare nut of the valve on the liquid side.

(Unit: N•m)

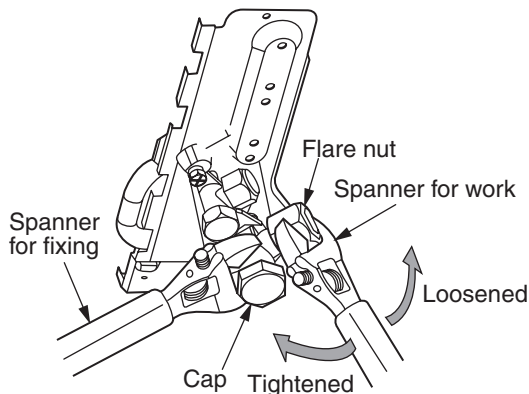
Outer dia. of copper pipe	Tightening torque
6.4 mm (diam.)	14 to 18 (1.4 to 1.8 kgf•m)
12.7 mm (diam.)	50 to 62 (5.0 to 6.2 kgf•m)



### NO GOOD



Valve at gas side



### ⚠ CAUTION

1. Do not put the spanner on the cap. The valve may be broken.
2. If applying excessive torque, the nut may be broken according to some installation conditions.

- After the installation work, be sure to check gas leak of connecting part of the pipes with nitrogen.

- Pressure of R410A is higher than that of R22 (Approx. 1.6 times).

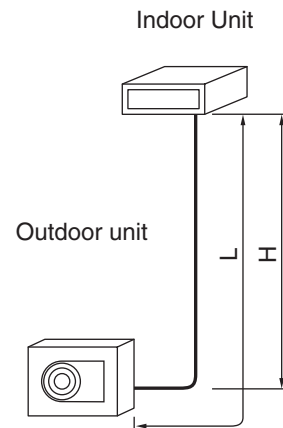
Therefore, using a torque wrench, tighten the flare pipe connecting sections which connect the indoor/outdoor units at the specified tightening torque.

Incomplete connections may cause not only a gas leak, but also a trouble of the refrigeration cycle.

**Do not apply refrigerating machine oil to the flared surface.**

## ■ Refrigerant Pipe Length

Figure of Single



Allowable pipe length (m)	Height difference (Indoor-outdoor H) (m)		Pipe diameter (mm)		Number of bent portions
	Indoor unit: Upper	Outdoor unit: Lower	Gas side	Liquid side	
Total length L	30	30	Ø12.7	Ø6.4	10 or less

# 6 AIR PURGING

## ■ Airtight test

Before starting an airtight test, further tighten the spindle valves on the gas side and liquid side.

Pressurize the pipe with nitrogen gas charged from the service port to the design pressure (4.15 Mpa) to conduct the airtight test. Perform gas leak check using a leak tester for HFC refrigerant.

After the airtight test is completed, evacuate the nitrogen gas.

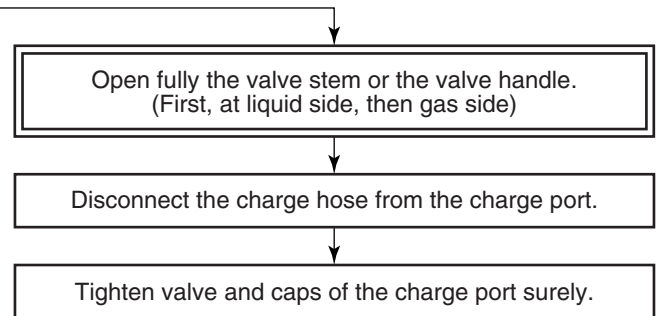
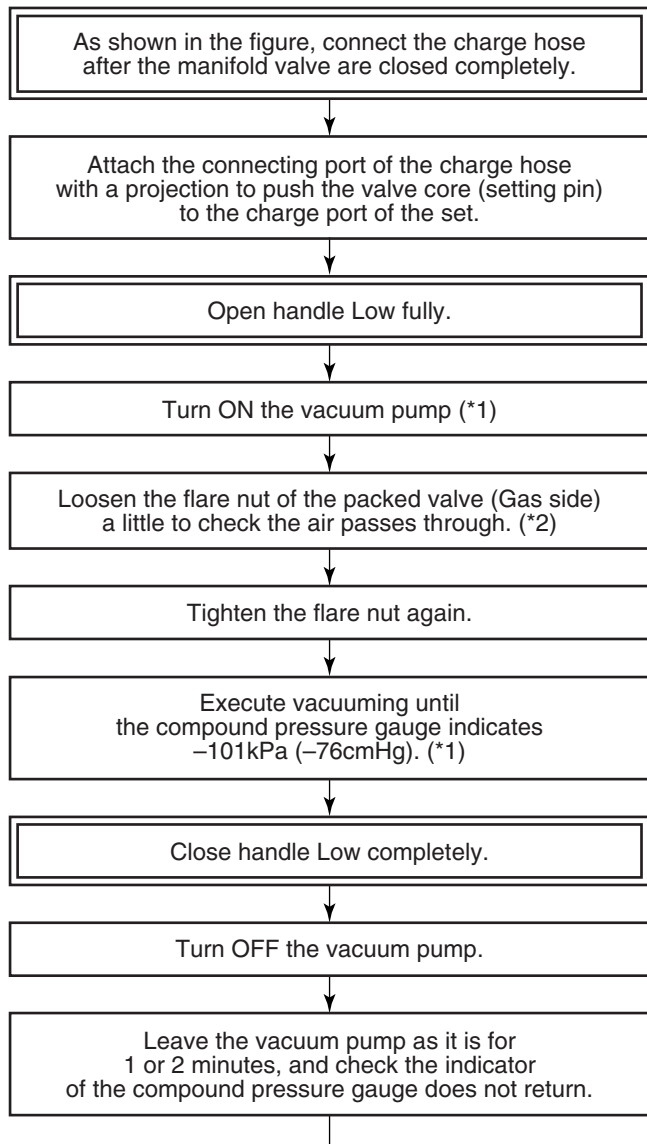
## ■ Air Purge

With respect to the preservation of terrestrial environment, adopt "Vacuum pump" for air purge (Evacuate air in the connecting pipes) when installing the unit.

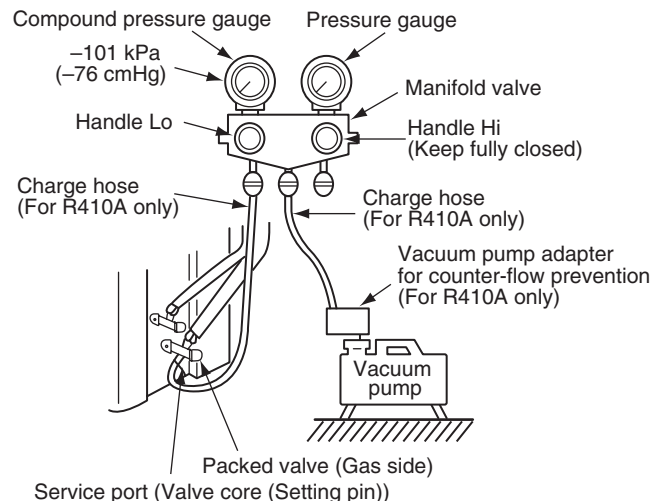
- Do not discharge the refrigerant gas to the atmosphere to preserve the terrestrial environment.
- Use a vacuum pump to discharge the air (nitrogen, etc.) remained in the set.  
If the air remains, the capacity may decrease.

For the vacuum pump, be sure to use one with backflow preventer so that the oil in the pump does not backflow into the pipe of the air conditioner when the pump stops. (If oil in the vacuum pump is put in an air conditioner including R410A, it may cause trouble on the refrigeration cycle.)

### Vacuum pump



- \*1 Use the vacuum pump, vacuum pump adapter, and gauge manifold correctly referring to the manuals supplied with each tool before using them.  
Check that the vacuum pump oil is filled up to the specified line of the oil gauge.
- \*2 When air is not charged, check again whether the connecting port of the discharge hose, which has a projection to push the valve core, is firmly connected to the charge port.



# 6 AIR PURGING

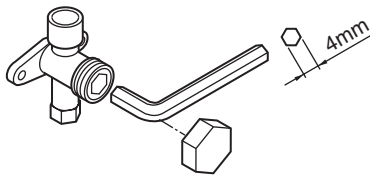
## How to open the valve

Confirm the structure surely and then open or close the valve.

### ◆ Liquid side, Gas side

Open the valve with a 4 mm hexagon wrench.

[Hexagon wrench is required.]



## Valve handling precautions

- Open the valve stem until it strikes the stopper. It is unnecessary to apply further force.
- Securely tighten the cap with a torque wrench.
- Cap tightening torque

Valve size	Ø6.4 mm	14 to 18 N•m (1.4 to 1.8 kgf•m)
	Ø12.7 mm	33 to 42 N•m (3.3 to 4.2 kgf•m)
Charge port		14 to 18 N•m (1.4 to 1.8 kgf•m)

## ■ Replenishing Refrigerant

This model is a 30 m chargeless type that does not need to replenish refrigerant for refrigerant pipes up to 30 m.

When a refrigerant pipe longer than 30 m is used, add the specified amount of refrigerant.

### Refrigerant replenishing procedure

1. After the vacuuming of the refrigerant pipe is completed, close the valves and then charge refrigerant while the air conditioner is not working.
2. When the refrigerant cannot be charged to the specified amount, charge the required amount of refrigerant from the charge port of the valve on the gas side during cooling.

### Requirement for replenishing refrigerant

Replenish liquid refrigerant.

When gaseous refrigerant is replenished, the refrigerant composition varies, which disables normal operation.

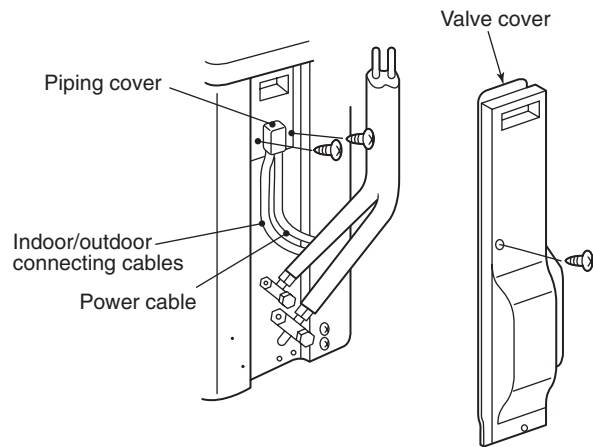
### Additional amount of refrigerant

21 ~ 30 m : L
20 g × (L - 20)

- L: Pipe length
- For additional amount of refrigerant for twin-indoor unit types, refer to the installation manual supplied with the branching pipe (sold separately).
- The refrigerant need not be reduced for a 30 meter (or less) refrigerant pipe.

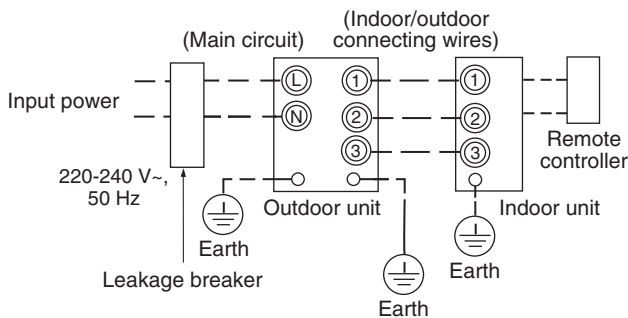
# 7 ELECTRICAL WORK

1. Remove screws of the valve cover.
2. Pull the valve cover downward to remove it.



## ■ Wiring between Indoor Unit and Outdoor Unit

The dashed lines show on-site wiring.



- Connect the indoor/outdoor connecting wires to the identical terminal numbers on the terminal block of each unit. Incorrect connection may cause a failure. For the air conditioner, connect a power wire as mentioned below.

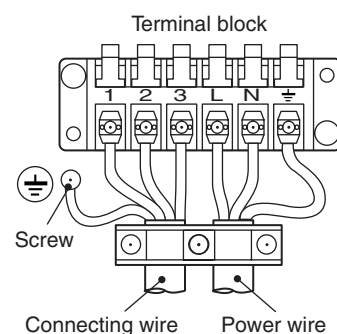
Model	RAV-SP40, RAV-SP45
Power supply	220-240V~, 50 Hz
Maximum running current	15 A
Installation fuse rating	16 A (all types can be used)
Power wire	H07 RN-F or 60245 IEC 66 (2.5 mm <sup>2</sup> or more)
Indoor/outdoor connecting wires	H07 RN-F or 60245 IEC 66 (1.5 mm <sup>2</sup> or more)

### CAUTION

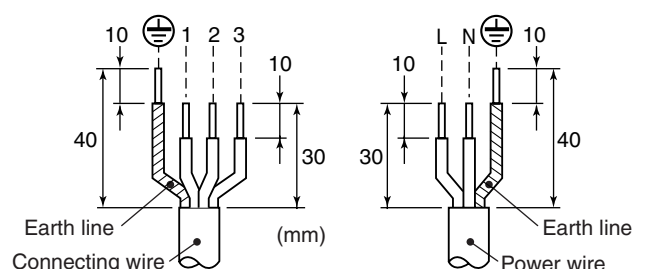
- Wrong wiring may cause a burn-out to some electrical parts.
- Be sure to use the cord clamps attached to the product.
- Do not damage or scratch the conductive core and inner insulator of power and inter-connecting wires when peeling them.
- Use the power and Inter-connecting wires with specified thickness, specified type and protective devices required.

### How to wire

1. Connect the connecting wire to the terminal as identified with their respective numbers on the terminal block of indoor and outdoor unit.  
H07 RN-F or 60245 IEC 66 (1.5 mm<sup>2</sup> or more)
2. When connecting the connecting wire to the outdoor unit terminal, prevent water coming in the outdoor unit.
3. Insulate the unsheathed cords (conductors) with electrical insulation tape. Process them so that they do not touch any electrical or metal parts.
4. For inter connecting wire, do not use a wire jointed to another on the way.  
Use wires long enough to cover the entire length.



### Stripping length power cord and connecting wire



## 7 ELECTRICAL WORK

---

### CAUTION

---

- The installation fuse must be used for the power supply line of this air conditioner.
  - Incorrect/incomplete wiring might cause an electrical fire or smoke.
  - Prepare the exclusive power supply for the air conditioner.
  - This product can be connected to the mains.  
Connection to the fixed wiring : A switch which disconnects all poles and has a contact separation of at least 3 mm must be incorporated in the fixed wiring.
- 

## 8 EARTHING

---

### WARNING

---

- **Be sure to connect earth wire. (grounding work)**  
Incomplete grounding cause an electric shock.
- 

Connect the earth line properly following applicable technical standards.

Connecting an earth line is essential to prevent electric shock and to reduce noise and electricity charge on the outdoor unit surface due to high frequency generated by the frequency converter (inverter) in the outdoor unit.

If you touch the charged outdoor unit without earth line, you may feel electric shock.

## 9 FINISHING

---

After the refrigerant pipe, inter-unit wires, and drain pipe have been connected, cover them with finishing tape and clamp them to the wall with off-the-shelf support brackets or equivalent.

Keep the power wires and indoor/outdoor connecting wires off the valve on the gas side or pipes that have no heat insulator.

## 10 TEST RUN

---

- **Turn on the leakage breaker at least 12 hours before starting a test run to protect the compressor during startup.**  
To protect the compressor, power is supplied from the 220-240V AC input to the unit to preheat the compressor.
- **Check the following before starting a test run.**
  - **All pipes are connected securely without leak.**
  - **The valve is open.**  
If the compressor is operated with the valve closed, the outdoor unit is overpressurized, which may damage the compressor or other components.  
If there is a leak at a connecting part, air is sucked and the internal pressure further increases, which may cause a burst or injury.
- Operate the air conditioner in the correct procedure specified in the Owner's Manual.



# 11 FUNCTIONS TO BE IMPLEMENTED LOCALLY

## ■ Handling Existing Pipe

When using the existing pipe, carefully check it for the following:

- Wall thickness (within the specified range)
- Scratches and dents
- Water, oil, dirt, or dust in the pipe
- Flare looseness and leakage from welds
- Deterioration of copper pipe and heat insulator

### Cautions for using existing pipe

- Do not reuse the flare to prevent gas leak.  
Replace it with the supplied flare nut and then process it to a flare.
- Blow nitrogen gas or use an appropriate means to keep the inside of the pipe clean. If discolored oil or much residue is discharged, wash the pipe.
- Check welds, if any, on the pipe for gas leak.

**When the pipe corresponds to any of the following, do not use it. Install a new pipe instead.**

- The pipe has been open (disconnected from indoor unit or outdoor unit) for a long period.
- The pipe has been connected to an outdoor unit that does not use refrigerant R22, R410A or R407C.
- The existing pipe must have a wall thickness equal to or larger than the following thickness.

Reference outside diameter (mm)	Wall thickness (mm)
Ø6.4	0.8
Ø12.7	0.8

- Never use any pipe with a wall thickness less than these thicknesses due to insufficient pressure capacity.

## ■ Recovering Refrigerant

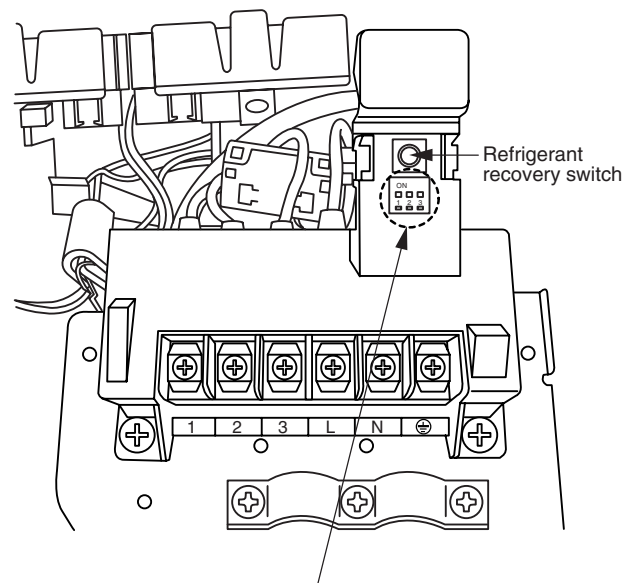
- When recovering refrigerant in case of reinstallation of the indoor or outdoor unit, etc., use the refrigerant recovery switch on the terminal block of the outdoor unit.

### Work procedure

1. Be sure to operate the air conditioner after stopping it once.
2. Turn on the power supply.
3. Using the remote controller, set FAN operation to the indoor unit.
4. Pushing the refrigerant recovery switch for 2 seconds or more on the terminal block of the outdoor unit starts the forced cooling operation. (Max. 10 minutes), and then the refrigerant is recovered by operation of the valve.
5. After recovery of the refrigerant, push the refrigerant recovery switch together with closing the valve. The operation stops.
6. Turn off the power supply.

**⚠ DANGER**

**Take care for an electric shock because the control P.C. board is electrified.**



**⚠ WARNING**

Never touch these switches because they are those for service check; otherwise the air conditioner may not operate normally.

# 12 APPLICABLE CONTROL OF OUTDOOR UNIT

---

You can response to the following items by attaching the parts sold separately  
“Application control kit” (TCB-PCOS1E).

## Demand control

- It saves the capacity of the outdoor unit by outside Demand signal to correspond to the temporary peak cut.
- The capacity saving can be adjusted with three steps, 75%, 50%, and operation stop.

## Night operation control (Sound reduction)

In order to reduce noise level in the night-time, if incorporating this control with a timer being on the market, the outdoor operating sound level will be reduced by approx. 5dB in cooling operation.

## Compressor operation output

The check of the compressor operation time required of a maintenance etc.

# 13 APPENDIX

## Instruction of Works:

**The existing R22 and R407C piping can be reused for our digital inverter R410A products installations.**

### NOTE)

Confirmation of existence of scratch or dent of the former pipes to be applied and also confirmation of reliability of the pipe strength are conventionally referred to the local site.

If the definite conditions can be cleared, it is possible to update the existing R22 and R407C pipes to those for R410A models.

### [Basic conditions need to reuse the existing pipe]

Check and observe three conditions of the refrigerant piping works.

1. Dry (There is no moisture inside of the pipes.)
2. Clean (There is no dust inside of the pipes.)
3. Tight (There is no refrigerant leak.)

### [Restricted items to use the existing pipes]

In the following cases, the existing pipes cannot be reused as they are. Clean the existing pipes or exchange them with new pipes.

1. When a scratch or dent is heavy, be sure to use the new pipes for the works.
2. When the thickness of the existing pipe is thinner than the specified "Pipe diameter and thickness" be sure to use the new pipes for the works.
  - The operating pressure of R410A is high (1.6 times of R22 and R407C). If there is a scratch or dent on the pipe or thinner pipe is used, the pressure strength is poor and may cause breakage of the pipe at the worst.

### \* Pipe diameter and thickness (mm)

Pipe outer diameter		Ø6.4	Ø9.5	Ø12.7	Ø15.9	Ø19.0
Thickness	R410A	0.8	0.8	0.8	1.0	1.0
	R22 (R407C)					

- In case that the pipe diameter is Ø12.7 mm or less and the thickness is less than 0.7 mm, be sure to use the new pipes for works.
3. The pipes are left as coming out or gas leaks. (Poor refrigerant)
    - There is possibility that rain water or air including moisture enters in the pipe.
  4. Refrigerant recovery is impossible. (Refrigerant recovery by the pump-down operation on the existing air conditioner)
    - There is possibility that a large quantity of poor oil or moisture remains inside of the pipe.

5. A dryer on the market is attached to the existing pipes.
  - There is possibility that copper green rust generated.
6. Check the oil when the existing air conditioner was removed after refrigerant had been recovered. In this case, if the oil is judged as clearly different compared with normal oil
  - The refrigerator oil is copper rust green : There is possibility that moisture is mixed with the oil and rust generates inside of the pipe.
  - There is discolored oil, a large quantity of the remains, or bad smell.
  - A large quantity of sparkle remained wear-out powder is observed in the refrigerator oil.
7. The air conditioner which compressor was exchanged due to a faulty compressor. When the discolored oil, a large quantity of the remains, mixture of foreign matter, or a large quantity of sparkle remained wear-out powder is observed, the cause of trouble will occur.
8. Installation and removal of the air conditioner are repeated with temporary installation by lease and etc.
9. In case that type of the refrigerator oil of the existing air conditioner is other than the following oil (Mineral oil), Suniso, Freol-S, MS (Synthetic oil), alkyl benzene (HAB, Barrel-freeze), ester series, PVE only of ether series.
  - Winding-insulation of the compressor may become inferior.

### NOTE)

The above descriptions are results of confirmation by our company and they are views on our air conditioners, but they do not guarantee the use of the existing pipes of the air conditioner that adopted R410A in other companies.

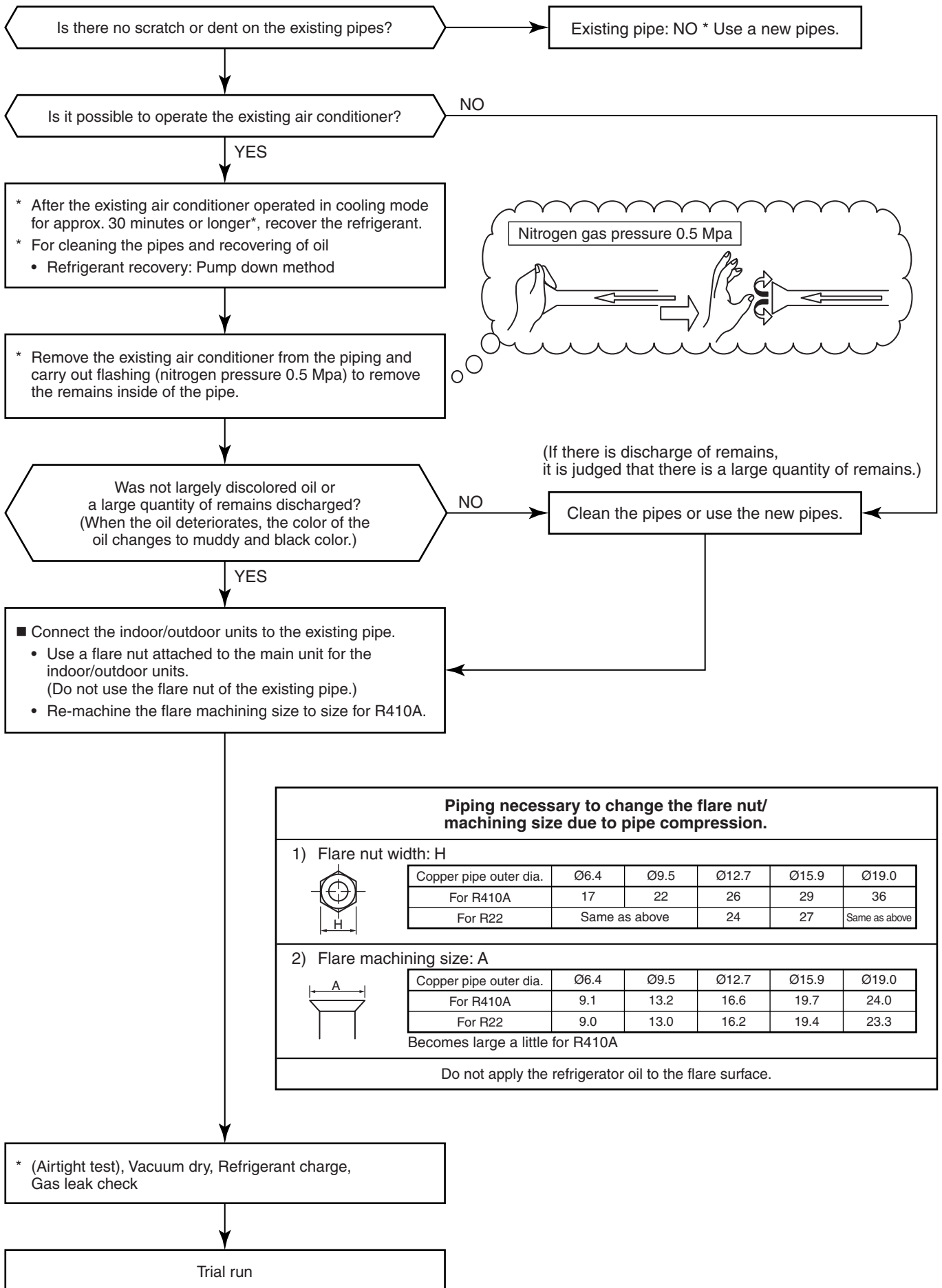
### [Curing of pipes]

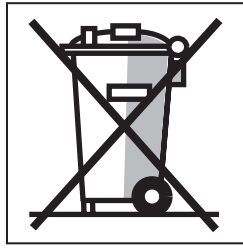
When removing and opening the indoor unit or outdoor unit for a long time, cure the pipes as follows:

- Otherwise rust may generate when moisture or foreign matter due to dewing enters in the pipes.
- The rust cannot be removed by cleaning, and a new piping work is necessary.


Place position	Term	Curing manner
Outdoors	1 month or more	Pinching
	Less than 1 month	
Indoors	Every time	Pinching or taping

# 13 APPENDIX





**READ BEFORE INSTALLING THE UNIT. KEEP IN A SAFE PLACE THE INFORMATION IN THIS BOOKLET IS NEEDED FOR END OF LIFE, DISPOSAL OR REUSE OF THE UNIT**

- We are very sensitive to environment and welcomes the 2002/96/EC Directive WEEE (Waste Electrical and Electronic Equipment).
- This product is compliant with EU directive 2002/96/EC.  
It must be collected separately after its use is completed, and cannot be disposed as unsorted municipal waste.
- The objective of EU directive 2002/96/EC are to tackle the fast increasing waste stream of electrical and electronic equipment, increase recycling of electric & electronic equipment (“EEE”), and to limit the total quantity of waste EEE (“WEEE”) going to final disposal.
- The crossed out wheeled bin symbol  that is affixed to the product means that this product falls under the Directive.
- The user is responsible for returning the product to the appropriate collection facility, as specified by your municipality or the distributor. In case of installation of a new product, it may be possible to have the distributor pick up old WEEE directly.
- The producer, importer and distributor are responsible for collection and treatment of waste, either directly or through a collective system. The list of our distributor in each country is shown in the attached table.
- In case of violation of the Directive, sanctions are set in each country.
- We are in general following the “CECED interpretation”, and consider the WEEE applicable to Portable units, Dehumidifiers, WRACs (Window Room Air Conditioners), Split Systems up to 12 kW, plug in refrigerators and freezers.
- Nevertheless, there may be difference among member state laws.  
In case country law exclude some products from WEEE scope, country law must be followed, and WEEE obligations do not have to be followed for products that fall out of country law scope.
- This directive does not apply to products sold outside European Community. In case the product is sold out of Eu, WEEE obligations do not have to be followed, while compliance with local regulation must be ensured.
- For additional information, please contact the municipal facility, the shop/dealer/installer that have sold the product, or the producer.

❶ Country, ❷ Name of Company responsible for WEEE.

❶	❷	❶	❷	❶	❷
Austria	AIRCOND, Klimaanlagen Handelsgesellschaft m.b.H Petesgasse 45, A-8010 Graz Austria	Holland	INTERCOOL Technics BV Nikkelstraat 39, Postbus 76 2980 AB Ridderkerk Netherlands	Portugal	Carrier Portugal - AR Condicionado LDA Avenida do Forte, Nr. 3 Editi cio Suecia I, Piso 1 Camaxide 2794-043 Portugal
Belgium	DOLPHIN NV, Fotografi elaan 12, B-2610, Antwerpen Belgium	Ireland	GT Phelan Unit 30 Southern Cross Business Park Bray Co Wicklow Ireland	UK	Toshiba Carrier UK Ltd Porsham Close, Belliver Ind. Est. Plymouth, Devon, PL6 7DB
Cyprus	Carrier Hellas Airconditioning S.A.- 4g Andersen street-11525 Athens Greece	Italy	Carrier SpA Via R. Sanzio, 9 20058 Villasanta (Milano) Italy	Czech Republic	AIRCOND, , Klimaanlagen Handelsgesellschaft m.b.H Petersgasse 45, A-8010 Graz Austria
Denmark	GIDEX A/S, Korshoj 10, 3600 Frederikssund, Denmark	Latvia	Carrier OY Linnavuorentie 28A 00950 Helsinki Finland	Slovakia	AIRCOND, , Klimaanlagen Handelsgesellschaft m.b.H Petersgasse 45, A-8010 Graz Austria
Estonia	Carrier OY Linnavuorentie 28A 00950 Helsinki Finland	Lithuania	Carrier OY Linnavuorenlie 28A 00950 Helsinki Finland	Slovenia	AIRCOND, , Klimaanlagen- Handelsgesellschaft m.b.H, Petersgasse 45, A-8010 Graz, Austria
Finland	Carrier OY Linnavuorentie 28A 00950 Helsinki Finland	Luxembourg	DOLPHIN NV Fotografi elaan 12, B-2610, Antwerpen Belgium	Spain	Carrier Espana S.L. - Paseo Castellana 36-38, 28046 Madrid
France	Carrier S.A. Route de Thil BP 49 01122 Montiuuel Cedex France	Malta	CUTRICO Services Ltd, Cutrico Building Psala Street, Sta Venea HMR 16 Malta	Sweden	Carrier AB - P.O.BOX 8946- Arods Industrivag 32 . S-402 73 Gothenburg
Germany	Carrier GmbH & Co. KG Edisonstrasse 2 85716 Unterschleissheim	Norway	Carrier AB - P.O.BOX 8946- Arods Industrivag 32. S-402 73 Gothenburg Sweden	Hungary	AIRCOND, Klimaanlagen Handelsgesellschaft m.b.H Petersgasse 45, A-8010 Graz Austria
Greece	Carrier Hellas Airconditioning S.A.- 4g Andersen street-11525 Athens Greece	Poland	Carrier Polska Sp. Z.o.o. Postepu 14 02-676 Warsaw Poland		

