



# Vacuum Equipment Precautions 1

Be sure to read this before handling products.

## Design/Selection

### Warning

#### 1. Confirm the specifications.

Products represented in this catalog are designed only for use in compressed air systems (including vacuum).

Do not operate at pressures, temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

Please contact SMC when using a fluid other than compressed air (including vacuum).

We do not guarantee against any damage if the product is used outside of the specification range.

#### 2. Safe designs should be developed, which account for the possibility of accidents resulting from a drop in vacuum pressure due to power failure, trouble with the air supply, etc.

If vacuum pressure drops and there is a loss of vacuum pad adsorption force, workpieces being carried may fall, causing human injury or damage to machinery. Sufficient safety measures should be implemented, such as drop prevention, to avoid any accidents.

#### 3. Follow vacuum specifications for vacuum switching valves and vacuum release valves.

If non-vacuum equipment is installed in a vacuum piping, vacuum leakage will occur. Therefore, select only equipment for vacuum specifications.

#### 4. Select an ejector which has a suitable suction flow rate.

<When there is vacuum leakage from the workpiece or the piping>  
If the ejector's suction flow rate is too low, the adsorption will be poor.

<When piping is long or the diameter is large>  
The adsorption response time will delay due to the increased volume of the piping.  
Select an ejector with a suitable suction flow rate by referring to the technical data.

#### 5. If the suction flow rate is too high, setting of vacuum switch will become difficult.

Setting the vacuum switch when adsorbing a small (few millimeter) workpiece will sometimes become difficult, if the selected ejector has a high suction flow rate and there is a small pressure difference when adsorbing and releasing the workpiece.

#### 6. When two or more pads are piped to one ejector, if one pad releases its workpiece, the other pads will also release.

When one pad releases its workpiece, there is a drop in vacuum pressure which causes the other pad to release its workpiece as well.

#### 7. When separating the pad from the workpiece, break the vacuum and confirm that the pressure is atmospheric pressure.

Do not separate them forcibly while vacuum pressure exists between them. This may cause cracking, tearing, or distortion of the pad, or cause the pad to come off the adapter.

#### 8. Do not apply a lateral load (force), such as rotation or sliding force of the workpiece, to the adsorption surface of the pad during the adsorption of a workpiece.

This may cause deformation, cracking, tearing, or distortion of the pad, or cause the pad to come off the adapter.

#### 9. Do not disassemble the product or make any modifications, including additional machining.

Doing so may cause human injury and/or an accident. When disassembling or assembling the product for the purpose of replacing parts, etc., be certain to follow the operation manual or catalogs.

#### 10. Vacuum holding using check valves

SMC can issue no guarantees regarding the maintenance of workpiece adsorption when using check valves. Take separate safety measures to prevent workpieces from dropping in the case of an electrical power outage, etc.

Please consult with SMC when using check valves as a means of preventing interference caused by the exhaust from nearby ejectors.

#### 11. Air leakage from main valve

SMC does not guarantee zero air leaks from the main valve used for the vacuum ejector/vacuum pump system. If air leakage is a problem, please contact SMC.

#### 12. Vacuum pads are not guaranteed for zero air leakage (vacuum holding).

### Caution

#### 1. Mounting the suction filter

Because the suction of vacuum equipment acts not only on workpieces but also on dust or water droplets in the surrounding atmosphere, steps must be taken to prevent their penetration into the equipment's interior. Even when using equipment equipped with filters, if there is a considerable amount of dust in the environment, use a separately ordered large-size filter as well.

If there is a possibility of water droplets being sucked in by the vacuum, use a drain separator for vacuum.

#### 2. The maximum vacuum pressure of the vacuum ejector is affected by the atmospheric pressure of the operating environment.

As atmospheric pressure changes based on altitude, climate, etc., the actual maximum vacuum pressure may not reach the value listed in the specifications.

#### 3. For information on related items, such as directional control equipment and actuators, refer to the caution sections in each respective catalog.

#### 4. Do not use the product in an environment that exposes it to vibration. If the product is used in such an environment, we can offer a lock nut type product to prevent it from loosening. Please contact SMC for the part number.

#### 5. Foreign matter may get inside the pad.

Although SMC gives full attention to prevent foreign matter from getting inside the product during pad molding, it is difficult to remove foreign matter from the molded product completely. Therefore, products with imperceptible, fine foreign matter are determined as acceptable and shipped to customers.



# Vacuum Equipment Precautions 2

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## Design/Selection

### ⚠ Caution

#### 6. There is a possibility of crystallized white powder or exuded liquid forming on the rubber surface.

The crystallized powder is called bloom, and the exuded liquid is called bleed. Bloom and bleed do not affect product operation. This phenomenon is caused by rubber compounding agents, such as a vulcanizing agent, antioxidants, oxidation inhibitors, softeners, parting agents, etc., and differs depending on the rubber material. As this phenomenon is influenced by changes in the environment (temperature differences, light (fluorescent light), humidity, etc.), the occurrence time cannot be estimated.

## Mounting

### ⚠ Warning

#### 1. Operation manual

Install the products and operate them only after reading the operation manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

#### 2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance and inspection.

#### 3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications.

#### 4. Be sure to secure the product in place when mounting the pad.

Not securing it firmly into place may cause problems.

#### 5. Use caution when implementing rotating transfer with a pad or when using workpieces and pads with a deviation in the center of the suction position.

Screw looseness due to rotation and pad rotation may cause problems. Apply a screw lock agent as necessary.

#### 6. Avoid operation in a rotational direction by using the ball joint pad mechanism.

Wear may cause problems.

#### 7. A buffer is used to decrease the load applied to the pad (horizontal lifting).

A malfunction may occur when the buffer is used for inclined or vertical lifting.

#### 8. After the stroke, make sure that the buffer returns to the initial state before starting the next process.

Malfunctions may occur.

#### 9. When pushing a pad to a workpiece, make sure not to apply an impact or a large force.

This will lead to premature deformation, cracking, or wearing of the pad. When pushing a pad onto a workpiece, operate within the deformable range of the pad skirt.

#### 10. Do not obstruct the exhaust port of the ejector.

If the exhaust port is obstructed when mounted, a vacuum will not be generated. Also, do not obstruct the exhaust port with the goal of removing the workpiece. It may cause damage to the equipment.

## Piping

### ⚠ Caution

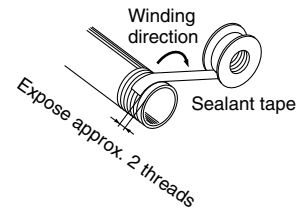
#### 1. Refer to the Fittings and Tubing Precautions (pages 52 to 56) for handling One-touch fittings.

#### 2. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil, and other debris from inside the pipe.

#### 3. Winding of sealant tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



#### 4. Use piping with adequate conductance.

Select equipment and piping for the vacuum side which has adequate conductance so that the ejector's maximum suction flow rate can be accommodated by the piping.

Also, make sure that there are no unnecessary restrictions, leaks, etc., along the course of the piping. Furthermore, the air supply should be designed while taking into consideration the ejector's maximum air consumption and the air consumption of other pneumatic circuits.

#### 5. Avoid disorganized piping.

Piping which is direct and of the shortest possible length should be used for both the vacuum and supply sides. Disorganized piping should be avoided. Unnecessary length increases the piping volume, and thus increases the response time.

#### 6. Use piping with large conductance on the exhaust side of the ejector.

If the exhaust piping is restrictive, there will be a decline in the ejector's performance.

#### 7. Be certain that there are no crushed areas in the piping due to damage or bending.

## Vacuum Release Flow Adjusting Needle

### ⚠ Warning

#### 1. The pressure and flow rate of the vacuum release air to be output varies depending on the supply pressure, needle opening, and difference between the vacuum ejector system and the vacuum pump system. Conduct appropriate adjustments with the adjusting needle mounted on the actual machine while checking the effects on the workpiece.

#### 2. To adjust the flow rate, turn the adjusting needle to the right (clockwise) to decrease the flow rate, and turn it to the left (counterclockwise) to increase the flow rate.



# Vacuum Equipment Precautions 3

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## Air Supply

### ⚠ Warning

#### 1. Type of fluids

Be sure to use compressed air for the fluid. Please consult with SMC when using the product in applications other than compressed air.

Additionally, use purified compressed air, from which the water contents, oil contents, and drains have been removed completely.

#### 2. Control of supply air

Compressed air containing a large amount of water content, oil content, drain, etc., may cause the pneumatic equipment to malfunction. So, install an air filter, air dryer, or a mist separator. (A system with a quality grade of No. C, D, or higher in the air preparation equipment model selection guide of Best Pneumatics No. 6 is recommended.)

Additionally, when applying oil to compressed air that is used for directional control equipment or actuators, install piping separately so that air is supplied to the vacuum equipment before the oil is applied. If oil flows into the vacuum ejector/vacuum pump system, the silencer, nozzle, or filter may be clogged, causing reduced performance.

#### 3. Drain flushing

If drain in the air filter or mist separator is not removed, the drain flows from the outlet, causing the pneumatic equipment to malfunction.

If drain flushing is deemed difficult, it is recommended to use a product with an auto drain option. For details about compressed air quality, refer to the SMC Best Pneumatics No. 6 catalog.

#### 4. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils that include organic solvents, salt contents, corrosive gases, etc. This may cause the product to break or malfunction.

### ⚠ Caution

1. When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.

## Operating Environment

### ⚠ Warning

1. Do not use in an atmosphere containing corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.
2. Do not use in a place subject to heavy vibration and/or shock.
3. Do not use in an environment where flammable gas or explosive gas exists. Usage may cause a fire or explosion. The products do not have an explosion-proof construction.
4. The product should not be exposed to prolonged sunlight. Use a protective cover.
5. Remove any sources of excessive heat.
6. In locations where there is contact with spatter from water, oil, solder, etc., take suitable protective measures.
7. In cases where the vacuum unit is surrounded by other equipment, etc., or the unit is energized for an extended time, take measures to exhaust excess heat so that the temperature remains within the specifications.

## Operating Environment

### ⚠ Caution

1. Under certain conditions, the exhaust of the vacuum ejector may generate intermittent noises, and vacuum pressure may be uneven.

Using the ejector under these conditions will not result in decreased performance, but if the intermittent noise becomes a nuisance, or there is an adverse effect on the operation of the vacuum pressure switch, try lowering or raising the supply pressure of the vacuum ejector to find a supply pressure level at which the intermittent noise ceases.

## Maintenance

### ⚠ Warning

1. Perform maintenance and inspection according to the procedures indicated in the operation manual.

If handled improperly, malfunction or damage of machinery and equipment may occur.

2. Maintenance work

If handled improperly, compressed air can be dangerous. Assembly, handling, repair, and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.

3. Drain flushing

Remove drainage regularly from the water separator, air filters, drain separator for vacuum, etc.

4. Removal of equipment, and supply/exhaust of compressed air

Before components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.

When machinery is restarted after remounting or replacement, first confirm that measures are in place to prevent the lurching of actuators, etc. Then, confirm that the equipment is operating normally.

5. Perform maintenance of suction filters and silencers periodically.

The performance of an ejector will deteriorate due to clogged filters and silencers. High-flow filters should be used, especially in dusty locations.

6. Leakage or clogging of the air pressure circuit, wear, cracks, or deterioration of the pad, or buffer sliding failure (wear, galling, or other failure of the sliding parts) may lead to problems. Make sure to perform periodic maintenance and inspection.

7. When adsorbing a deformed or spherical workpiece, it is necessary to push the pad against it.

Even if the workpiece can be adsorbed in the initial operation, deformation, cracks, or wear of the pad may occur prematurely, causing problems. Make sure to perform periodic maintenance and inspection.