

Precautions to ensure safe usage

The precautions given below are intended to ensure safe and correct use of the products.
Note that certain restrictions apply to use of these products. Failure to observe these could result in injury or property damage.

 Warning	A potentially hazardous situation which could result in death or serious injury.
 Caution	A dangerous situation which could result in minor or medium injury and/or in which only property damage is foreseen.

 **Warning** TOYOX products have been developed and manufactured for general industrial applications.

For applications that require safety, confirm in advance.

Never use for implant or injection application or other applications where there is a possibility of the product partially remaining in the body.

Toyox makes no guarantee of the adaptability or safeness related to such applications.

Please read the Handling Precautions carefully before use.

Note: See the terminology glosses on our website for words marked with a ※.

TOYOSILICONE STEAM, TOYOSILICONE STEAM-S hoses

① Notes for using the hoses

-  **Warning** Do not use the hose outside the specified operating temperature range or operating pressure range.
- Hoses elongate and contract due to internal pressure, so be sure to allow enough room when piping the hose.
- When applying positive pressure, operate the valve opening and closing slowly to prevent impact pressure*1 from being applied.
- When using negative pressure, use of the hose may not be possible depending on the application and conditions (temperature, movement).
For guidelines regarding use with negative pressure, see "Vacuum Pressure Reference Range" (Fig. 1) in the additional materials.
- Depending on the conditions of use, extraction or elution of the compounding agent or other substance is possible. Check the usage conditions and effects on the product in advance before using the hose.
- Be sure to consult with Toyox in advance before using with a fluid that is an oil, powder, highly toxic chemical, high-concentration acid, high-concentration alkali, or similar substance.
- Silicone rubber has high gas permeability.
When transporting a gas, the gas may permeate the hose and leak from the hose surface or hose ends.
Be aware that when transporting a fluid that has odor, flavor, or color, the odor, flavor, or color may be transferred to the hose.
- Never use a silicone rubber hose with a non-polar organic solvent (benzene, toluene, hexane, etc.), halogenated hydrocarbon (methylene chloride, trichloroethane, etc.), high-concentration strong acid, strong alkali, mineral oil, or steam for a prolonged period of time (TOYOSILICONE THERMO Hose). Never use a silicone rubber hose with substances such as animal or vegetable oils which are at a temperature of 70° C or higher.
- Do not use with fuel oils.
-  **Warning** When using for steam, the saturated steam pressure should be 0.3 MPa (140° C) or less, and the hose should be used intermittently (max. 8 hours of continuous use per day) with one side open.
Never use the hose in steam-tight conditions. Doing so will shorten the service life of the hose.
-  **Warning** When used with steam and the hose is directly immersed in the tank fluid for boiling water or other applications, the hose will deteriorate and pieces of the hose may fall off, resulting in contamination. Use the hose in such a way that it is not directly immersed in the fluid, such as by attaching a pipe or similar item onto the hose.
- Do not use the hose below the minimum bending radius*3. Using the hose below the minimum bending radius will result in the hose becoming kinked, or in reduced pressure resistance.
- When using the hose for powders or granules, etc., make the bending radius of the hose as large as possible because wear may be more likely to occur depending on the conditions.
- Do not fully bend the hose near the coupling.
- Do not allow the hose to contact fire directly or come close to fire.
- Do not run over the hose with a vehicle.
- Do not use the hose if it is collapsed.
- Do not push hard angular objects such as iron on the hose or rub it hard.
- If a bending, stress, or other load is applied to the hose close to the coupling, there is the risk that the inner lining will be torn by the nipple threads and the hose will rupture.
- Because a silicone rubber hose is more likely to tear than a conventional soft PVC hose, be careful not to scratch it.
-  **Warning** Do not energize. Doing so may result in rupture of the hose or electric shock.
-  **Warning** Do not allow fluid to contact any part other than the inner surface of the hose and coupling.
Doing so may cause the fluid to penetrate the hose reinforcement layer, remain in the coupling, encourage bacteria (adhesion), and cause hose deterioration. In addition, contamination with dust or hose fragments (reinforcement material) on the outer surface may occur.

Estimated Service Lifetime (Replacement Interval) When Using with Steam (140°C, 0.3 MPa)

Usage condition	Estimated service lifetime (replacement interval) * Reference value
Used for 1 hour/day	800 operating days (36 months)
Used for 2 hours/day	400 operating days (18 months)
Used for 4 hours/day	200 operating days (9 months)
Used for 8 hours/day	100 operating days (4.5 months)

* The values in this table are not guaranteed values.

* Use the above as a guideline and perform hose replacement.

□ Maximum continuous usage is 8 hours/day.

② Notes for cutting the hoses

1. In order to retain pressure- and heat-resistant performance, the threads are specially braided for reinforcement. (If improperly cut, the threads may unravel and fall out; handle with due care.)
2. When cutting a hose, use as new a cutting blade as possible and make sure that the edge face of the hose is cut perpendicularly. If it is not perpendicular, the hose may leak or become disconnected.
3. When cutting a TOYOSILICONE STEAM S Hose, handle it with caution as there is a risk of injury from the end surface of the reinforcement material and of making holes in the hose.

③ Notes for assembly

1. We recommend using TOYOCONNECTOR, our dedicated coupling, for TOYOSILICONE THERMO Hose.
2. Use hose nipples suitable for the size of the hose. Do not use hose nipples with damaged or rusted surfaces.
3. Make sure the end of the barb fitting is as round as possible (0.3 R or more). Be careful with silicone rubber hoses, as they are easier to cut compared to conventional soft PVC hose.
4. When inserting the nipple barb into the hose, do not use oil on the hose or on the nipple barb, and do not treat the parts with fire. If insertion is difficult, use lukewarm water to warm the hose and try inserting the fitting again.
5. Insert the nipple barb completely into the hose.
6. Do not use one-push couplings. Hose may rupture.
7. Fasten clamps centered on the nipple barbs, taking care not to cut the exterior surface of the hose. Use two or more clamps for a large diameter hose that is 19φ or larger.
8. Fasten clamps with the specified clamping torque.
9. Retighten the hose clamp as necessary. Hose softens at high temperatures.
10. Take care not to injure hands when using a Phillips or slotted screwdriver.
11. Avoid the following because it may damage the inner lining of a hose and cause it to rupture.
 - Tightly fasten hose with a wire instead of a clamp.
 - Hit hose with a hammer when attaching / detaching a clamp.
 - Use a coupling with a damaged or rusty nipple.
12. The compression strength indicated in this brochure is based on data which was obtained from pressure tests conducted by Toyox using the hoses alone by its own testing method.
Therefore, the hose may be dislocated before the hose ruptures, or another problem may occur depending on the conditions of the connectors being set (the shapes of hose nipples, types of hose clamps, number of hose clamps, fastening torque and how they are crimped). Please select a safe, effective method for attaching couplings to the hoses based on the following data on withstanding pressure. For technological information on using couplings, please make inquiries through our Customer Advice Center.

④ Notes for inspections

1. Pre-work inspection: Before starting operation, check the hose for abnormalities, such as external damage, stiffening, softening and discoloration.
2. Regular inspection: During periods when the hose is in use, be sure to perform regular monthly inspections.

What to do if an abnormality is found

The life of hoses will be greatly affected by the physical properties, temperature, and flow rates of the fluid as well as by the frequency of pressurization and depressurization. If any of the following problems or similar signs are found in the pre-work or regular inspections, immediately cease use and replace the hose.

1. Abnormality near the coupling: localized stretching, bending, leakage or swelling
2. External damage: large scratches in the outer surface, cracking, or water infiltrating the reinforcement layer
3. Internal abnormalities: Bulging or ※5 separation of the inner surface, or wear that leads to exposure of the hose reinforcement material.
Note: In the case of abnormalities on the interior or exterior surface, hose scrapings and fragments of hose reinforcing materials may mix into the fluid inside the hose.
4. Other abnormal changes (stiffening, ※6 swelling, cracking, bulging, adsorption of the fluid odor, taste, or smell, discoloration of the reinforcement layer, etc.)

⑤ Notes for storage

1. Do not store outdoors or in a place subject to direct sunlight. This may cause the quality of the hose surface to deteriorate, becoming sticky and/or susceptible to cracking.
Store in a low-humidity, well-ventilated place. Store keeping the inside of the hose free from foreign matter and dust.
2. Do not store near rubber products. Even without direct contact, proximity may cause discoloration.

⑥ Notes for disposal

1. Do not incinerate the hose. The incineration may generate toxic gases or damage incinerators; therefore, the hose should be treated as industrial waste for disposal purposes.
2. The hose should be disposed of in accordance with the requirements of the local region.