# Rubber flexible hose selection criteria

### 1〉Max. working pressure
Highest operating pressure is the designed pressure (controlled by safety valves, etc.) of the facility or device to which the flexible hose is attached. A flexible hose can be safely used for a long time continuously when it is used under the pressure that is not more than this pressure. Only low pressure (1.5 MPa or less) may be used when the fluid is gas.

### 2〉Impact pressure
Hydraulic devices in general may generate an impact pressure that exceeds the upper limit of the pressure due to load differences. The waveform of the impact pressure usually includes waveform with peaks (highest operating pressure x 150%) and trapezoidal waveform (highest operating pressure x 133%).

### 3〉Bending radius
The pressure resistance of a flexible hose is lowered when the hose is bent. Please use it within the designated radius of bending.

### 4〉Temperature
A flexible hose has a slight influence on the service life of a flexible hose due to the fluid temperature.
Please use this product within the range of the fluid temperature described on the catalog.
Insulation is placed on the outside when the hose is used in the environment with high ambient temperature or thermal radiation, but the effect of the insulation is limited.

### 5〉Twist
A flexible hose tends to get twisted because of its flexibility; thus, please take precautions to prevent twisting as much as possible in pipe arrangement.
The service life is shortened when a hose is used while being twisted, and it may cause extraordinary damages. Please use a rotating joint when a twist is unavoidable.

### 6〉Fluid speed
Please determine the flexible hose specifications so that the speed of the fluid running through the flexible hose is kept at 10 m/sec or slower.
Excessive flow speed may cause heating, skiving (scraping of the inner rubber layer), or other conditions.

### 7〉Outer pressure
The service life of a flexible hose may be lowered, or abnormal damages may occur if a heavy object is dropped on a flexible hose or a strong impact is applied on it.
Also, please study the method of protecting a flexible hose to prevent abrasion or damage caused by coming in contact with other objects.

### 8〉Fluid
Appropriate fluid varies depending on the series of the flexible hose.
Please check the types and select them appropriately.

# Materials of rubber flexible hose and fittings and fluids to be used

The relationship among the hose specifications, materials of metal fittings, and fluids to be used is described below.
Please refer to the chart when selecting a hose.
Please take precautions that conditions vary depending on the temperature and concentration of fluid.
※DH-T is for steam, and DH-W is for water-based hydraulic fluid (water-glycol fluid).
※Please keep the pressure at 1.0 MPa or less when using gases.

| kind of fluid | hose standard | | Fitting | | |
|---|---|---|---|---|---|
| | DH-B DH-D | DH-O | steel | stainless | brass |
| ASPFALT | ○ | × | ◎ | ◎ | ○ |
| ACETALDEYDE | × | ◎ | – | – | – |
| ACETONE | × | ○ | ◎ | ◎ | ◎ |
| ACETYLENE | △ | ◎ | ◎ | ◎ | ○ |
| ANILINE | × | ◎ | ◎ | ◎ | × |
| AMMONIA GAS(cold) | ○ | ◎ | ◎ | ◎ | × |
| AMMONIA GAS(hot) | △ | ○ | ◎ | × | × |
| LIQUEFIED ANHYDROUS AMMONIA | ○ | ◎ | ◎ | ◎ | × |
| SULFUR DIOXIDE | △ | ◎ | ○ | ○ | △ |
| ISOOCTANE | ◎ | × | ◎ | ◎ | ○ |
| ASTM No.1 OIL | ◎ | × | ◎ | ◎ | ○ |
| ASTM No.3 OI | △ | × | ◎ | ◎ | ○ |
| ETHYL ALCOHOL | ◎ | ◎ | △ | ◎ | ◎ |
| CHLORINE 10% RT | ◎ | ◎ | × | × | △ |
| CHLORINE 36% RT | △ | ◎ | × | × | △ |
| LPG | ◎ | × | ◎ | ◎ | ○ |
| OLIVE OIL | ◎ | ◎ | ◎ | ◎ | ◎ |
| HYDROGEN PEROXIDE 5% RT | × | ◎ | × | ◎ | × |
| HYDROGEN PEROXIDE 30% RT | × | △ | × | ◎ | × |
| SEA WATER RT | ◎ | ◎ | △ | ◎ | △ |
| SODIUM HYDROXIDE 10% RT | ◎ | ◎ | ◎ | ◎ | × |
| SODIUM HYDROXIDE 30% 60℃ | ◎ | ◎ | ◎ | ◎ | × |
| GASOLINE | × | × | ◎ | ◎ | ◎ |
| FORMIC ACID 25% RT | × | ◎ | × | ◎ | △ |
| FORMIC ACID 50% RT | × | ◎ | × | ◎ | △ |
| CRESOL | × | × | – | – | – |
| CHLOROFORM | × | × | × | ◎ | × |
| GREASE | ○ | × | ◎ | ◎ | ◎ |
| GLYCERINE | ◎ | ◎ | ◎ | ◎ | ○ |
| KEROSENE | △ | × | ◎ | ◎ | ◎ |
| COKE-OVEN GAS | △ | △ | ◎ | ◎ | △ |
| MINERAL OIL | ◎ | × | ◎ | ◎ | ◎ |
| ACETIC ACID 10% RT | △ | △ | × | ◎ | × |
| ACETIC ACID 100% RT | × | × | × | ◎ | × |
| ETYL ACETATE | × | ○ | ○ | ○ | ○ |
| OXYGEN | × | × | × | ◎ | ◎ |
| CYCLO HEXANE | × | ○ | – | – | – |
| CARBON TETRACHLORIDE | × | × | △ | ○ | ○ |
| DIETHYLENE GLYCOL | ◎ | ◎ | ◎ | ○ | ○ |
| SODIUM HYPOCHLORITE 5% RT | △ | ◎ | × | ○ | × |
| SODIUM HYPOCHLORITE 5% 60℃ | × | ○ | × | ○ | × |
| HEAVY OIL(B、C) | ○ | × | ◎ | ◎ | ◎ |
| POTASSIUM DICHROMATE 10% RT | ◎ | ◎ | ◎ | ◎ | ◎ |

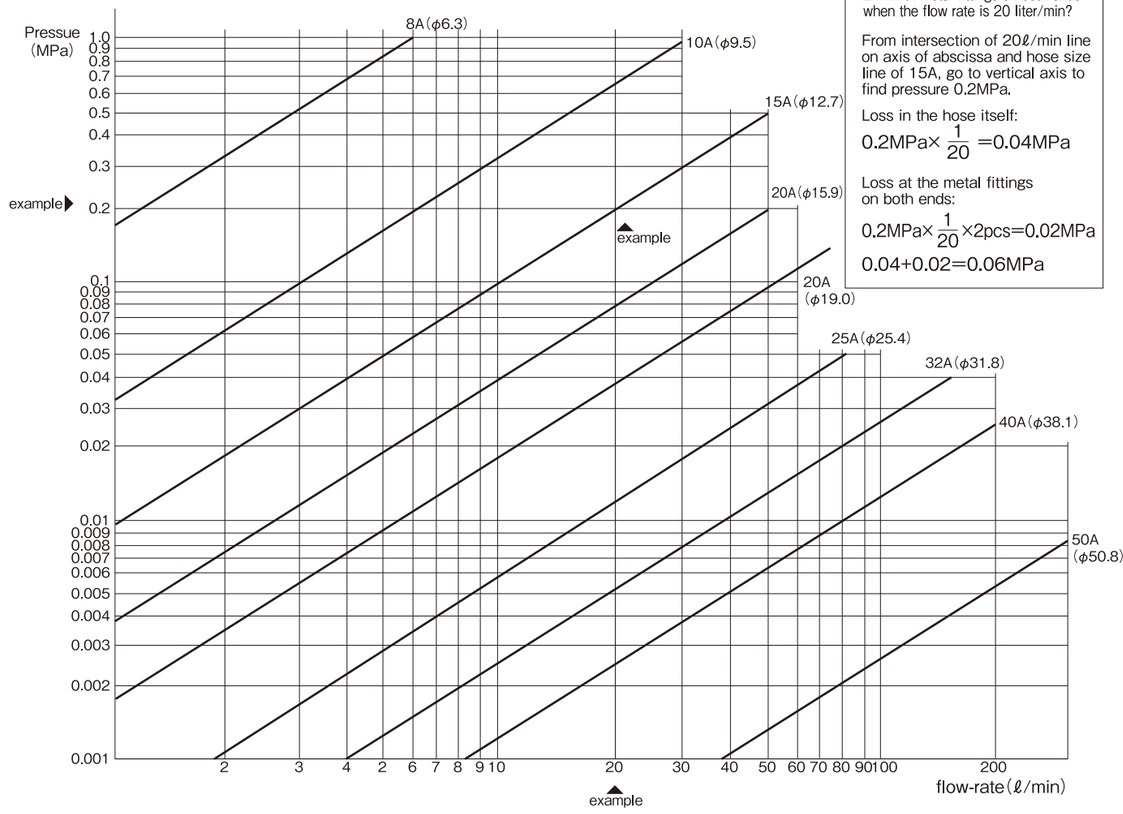
| kind of fluid | hose standard | | Fitting | | |
|---|---|---|---|---|---|
| | DH-B DH-D | DH-O | steel | stainless | brass |
| OXALIC ACID | ○ | ◎ | △ | ○ | △ |
| NITRIC ACID 10% RT | × | ◎ | × | ◎ | × |
| NITRIC ACID 30% RT | × | ○ | × | ◎ | × |
| LUBRICANT(mineral) | ◎ | × | ◎ | ◎ | ◎ |
| STEAM(for ST-hose only) | × | ◎ | ◎ | ◎ | ◎ |
| STEARIC ACID | ○ | ○ | △ | ○ | △ |
| PETROLEUM | ○ | × | ◎ | ◎ | ◎ |
| TAR | ○ | × | ◎ | ◎ | △ |
| CARBONIC ACID | ◎ | ◎ | × | ○ | × |
| CARBONIC ACID GAS(1.0MPa or below) | △ | △ | ◎ | ◎ | ◎ |
| NITROGEN(1.0MPa or below) | △ | △ | ◎ | ◎ | ◎ |
| NATURAL GAS(1.0MPa or below) | × | × | ◎ | ◎ | ○ |
| TRICHLORO ETHYLENE | × | × | △ | ◎ | ◎ |
| TOLUENE | × | × | ◎ | ◎ | ◎ |
| VEGETABLE OIL | ◎ | ◎ | ◎ | ◎ | ◎ |
| NAPHTHA | ○ | × | ◎ | ○ | ○ |
| CASTOR OIL | ◎ | ◎ | ◎ | ◎ | ◎ |
| VINEGAR | △ | ◎ | ○ | ◎ | ○ |
| PICRIC ACID | ○ | ○ | △ | ○ | × |
| BUTANE | ○ | △ | ◎ | ◎ | ◎ |
| FREON 12 | × | × | ◎ | ◎ | ◎ |
| FREON 22 | × | × | ◎ | ◎ | ◎ |
| PHENOL | × | ◎ | × | ◎ | ◎ |
| PROPANE | ◎ | × | ◎ | ◎ | ◎ |
| FUEL OIL | × | × | ◎ | ◎ | ◎ |
| BENZENE | × | × | ◎ | ◎ | △ |
| BORIC ACID | ◎ | ◎ | × | ◎ | △ |
| FORMALDEHYDE 40% RT | ○ | ◎ | ○ | ◎ | ○ |
| METHYL ALCOHOL | ○ | ◎ | △ | ◎ | ◎ |
| METHYL ETHYL KETONE | × | ○ | ○ | ○ | ○ |
| MONO CHLOROBENZENE | × | × | ○ | – | – |
| LACQUER | × | × | △ | ◎ | ◎ |
| LARD | ◎ | ◎ | ◎ | ◎ | ◎ |
| SULFURIC ACID 10% RT | ○ | ◎ | × | ○ | × |
| SULFURIC ACID 30% 60℃ | ○ | ◎ | × | △ | × |
| HYDROGEN SULFIDE | ○ | ◎ | △ | ○ | △ |
| PHOSPHORIC ACID 50% RT | ○ | ◎ | ○ | ○ | × |
| PHOSPHORIC ACID 30% 60℃ | ○ | ◎ | × | ○ | × |

◎ No affection or almost no affection.
○ Slight affection but applicable depending on condition.
△ Rather heavy affection.
× Not applicable.
RT: Room temperature



# Flow rate and pressure loss

Pressure loss occurs due to the friction resistance with flow rate inside a pressurized pipe.
The relationship between the fluid flow rate and pressure loss in a hose is described below.




### Method for using a graph

Example:
What is the pressure loss in a hose with the size 15A (φ12.7) and length 2 m with metal fittings on both ends when the flow rate is 20 liter/min?

From intersection of 20ℓ/min line on axis of abscissa and hose size line of 15A, go to vertical axis to find pressure 0.2MPa.

Loss in the hose itself:

$0.2\text{MPa} \times \frac{1}{20} = 0.04\text{MPa}$

Loss at the metal fittings on both ends:

$0.2\text{MPa} \times \frac{1}{20} \times 2\text{pcs} = 0.02\text{MPa}$

$0.04+0.02=0.06\text{MPa}$

# Design of the hose length and hose layout

1. Please take precautions on the hose length so that it would not create excessive sagging and touch other parts.
2. Please consider the expansion and contraction when the pressure is applied so that tensile force would not be applied on the hose.

Example 1: Straight pipe arrangement (Fig. 1)

free length of hose (L) $L \geqq \ell(1+0.04)$

Example 2: When securing both ends with U-shaped pipes (Fig. 2)

$L=2D+\pi R$

Example 3: When moving only by T at one end with U-shaped pipe (Fig. 3)

$L=2D+\pi R+T$

Straight pipe coefficient

| Hose NB | 8A (φ6.3) | 10A (φ9.5) | 15A (φ12.7) | 20A (φ15.9) | 20A (φ19.0) | 25A (φ25.4) | 32A (φ31.8) | 40A (φ38.1) | 50A (φ50.8) |
|---|---|---|---|---|---|---|---|---|---|
| D mm | 40 | 50 | 60 | 65 | 75 | 90 | 110 | 120 | 140 |

Fig.1

Fig.2

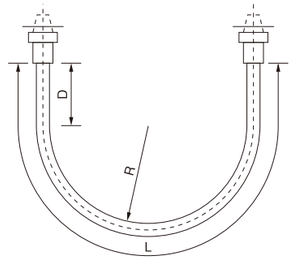



Fig.3