

# REFERENCES

VENAIR reputation as a worldwide leader in flexible silicone tubes has caught the attention of some of the most well-known brands across many sectors:

## FOOD

DANONE  
NESTLE  
SCHWEPPE  
COCA COLA  
KRONEBOURG

## PHARMACEUTICAL

PFIZER  
GLAXO-WELLCOME  
AVENTIS  
MILLIPORE  
SCHERING-PLOUGH

## COSMETICS

L'OREAL  
NIVEA  
ROC  
LANCASTER

## CHEMICAL

SANOFI  
BAYER  
HENKEL

## PRECAUTIONS FOR USE

### STERILISATION

All flexible hoses must be sterilized before use and must only be used for the intended purpose for which they were designed.

All hoses can be hot-air sterilized at a temperature of +250° C (+482° F) or steam sterilized at +135° C (+275° F) and a pressure of with 3.5 bars. Recommended maximum time: 1.5 hours +135° C (+275° F). A minimum of 1 hour must be left between successive sterilisation treatments in order for the hose to stabilise. It is important to note that steam alters the mechanical and volumetric properties of the silicone elastomer. We therefore recommend that all hoses are examined after 150 hours of steam sterilization treatments. The product may suffer from the effects of hydrolysis if the sterilisation time is exceeded.

### COMPATIBILITY OF THE PRODUCTS FOR TRANSPORTATION

Ensure that the flexible hose used is chemically compatible with the product. Cleaning products, such as caustic soda and nitric acid will not alter the quality of the product when diluted to 5 %. The type of fluid to be transported, the usage temperature and the maximum pH of the product must always be known. Silicone hoses are not recommended for conveying abrasive products.

### CRUSHING

A vehicle driving over a hose can cause the hose's textile elements to fray under the pressure, even if the hose does not have an inner spiral. Avoid stepping on hoses. The sudden pressure could damage them.

### PRESSURE

The pressure and temperature levels should be those indicated for each type of hose. During use, ensure that "water hammer" that could affect the hose does not occur. Water hammer can multiply the initially expected operating pressure by ten.

### USE STORAGE

Under no circumstances should flexible hoses be used to attempt to pull heavy loads. Avoid dragging hoses along the floor. If the hoses are temporarily out of service, they should be stored in a clean, dry place on non-sulfur steel shelving to avoid any reactions. Protect from light and ozone. Elbow adaptors of 45° or 90° must be connected to the bypass frame to eliminate any excessive curvature of the hose.

Our flexible hoses have a useful life of between 10 and 20 times than conventional hoses. Remember that once the hose is installed, it is a and moving element. These hoses have been manufactured with the greatest care, especially for use in such demanding industries. Taking good care of them will ensure a return on your investment. VENAIR shall not be held responsible for improper use of its hoses. Failure to comply with the precautions for use may result in unfavorable conditions.

## GOOD PRACTICE GUIDELINES CRITERIA FOR SELECTION

*Fascicle of documentation published by Afnor, September 1986.*

*Correspondence:*

*At the time that this fascicle was published, the ISO/DIN 18831 standard on the same subject already existed. Both documents are equivalent.*

*Analysis:*

*The present fascicle is intended to help users of rubber or plastic based elastic and flexible hoses to obtain optimal hose life by considering the different conditions of use.*

The purpose of the present fascicle is to provide users of rubber or plastic-based flexible hoses with recommendations to enable them to maintain the hoses in a similar condition to when supplied once they are in operation and to obtain an optimal service life by considering the conditions of use. These good practice guidelines are comprised of two parts:

### PART A: GENERAL RECOMMENDATIONS

Chapter 1 – Selection criteria

Chapter 2 – Storage conditions

Chapter 3 – Rules for use and maintenance

### PART B: ADDITIONAL RECOMMENDATIONS FOR SPECIFIC APPLICATIONS

Chapter 1 – Bending radius / Abrasive products

Chapter 2 – Corrosive and aggressive products

Chapter 3 – Inflammable products

### PART A: GENERAL RECOMMENDATIONS

#### 1. SELECTION CRITERIA

**1.1 When choosing a flexible hose for a certain application the following points must be considered:**

##### 1.1.1 Pressure – Vacuum

Operational pressure and vacuum values Water hammer

##### 1.1.2 Conveyed products

Nature, designation, concentration, working temperature. Form: liquid, gas, or solid. In the case of the latter: granulated, density, behavior of transported solid product, nature, speed of travel and flow of transported fluid. Frequency of use.

##### 1.1.3 Environment

Place of use, ambient temperature, hygrometric grade, exposure or lack of exposure to atmospheric agents and ozone. Products that may be in contact with the end of the flexible hose.

#### 1.1.4 Mechanical limitations

Minimum bending radius in service. Limitations in terms of traction, torsion, flexion, vibration or compression. Risk of impact, abrasion, corrosion. Work position: on the floor, suspended or submerged.

#### 1.1.5 Connection used or expected to be used

Connection: type, dimension and class of thread. Hose: Outer and inner diameter. Adjustment length.

#### 1.1.6 Particular conditions

With relation to this matter, it is in the user's interest to choose flexible hoses that conform to the standards in force in the country of use, provided that these exist within the field of application in question.

1.2 In cases of difficulties regarding interpretation or where the necessary information does not appear in the available documentation, the user of the flexible hose is advised to consult the manufacturer.

## 2. STORAGE CONDITIONS

### 2.1 General information

During use, flexible hoses are exposed to different factors which can cause their physical properties to alter, which in turn may lead to the hoses being unsuitable for use when the time comes. Listed below are some general storage conditions that will help prevent the deterioration of the products during storage.

### 2.2 Storage life

Storage life should be reduced as much as possible. Therefore stock rotation should be ensured, applying the rule "first in, first out". When long term storage cannot be avoided, e.g. for one year, the item should be thoroughly checked before it is put into operation.

### 2.3 Temperature and humidity

Storage temperature should be kept at between 0°C (32°F) and 35°C (95°F) wherever possible (optimum temperature 15°C/59°F). Relative humidity should preferably not exceed 65%.

### 2.4 Light

Items should be stored in a dark place, away from direct sunlight and intense artificial lighting. If storage facilities have windows or glazed areas, these should be covered with red, orange or white paint.

### 2.5 Environment

The hoses must not come into contact with certain products or be exposed to their vapors, particularly in the case of solvents, fuels, oils, fats, volatile components, acids, disinfectant products, etc. Moreover, some materials such as copper, iron and manganese can be harmful to some rubber-based mixtures.

### 2.6 Heat source

The distance between heat sources (e.g. heating units) and stored items must be sufficient to ensure that the temperature remains within the temperature limits defined in paragraph 2.3. If this is impossible, a heat screen should be used.

### 2.7 Electric or magnetic field

Electric or magnetic field variations should be prevented in the storage area since they can induce current in the metal connections and cause them to heat up. These fields can be caused by high voltage lines or high frequency generators.

### 2.8 Storage conditions

Flexible hoses should be stored without excessive restriction, lengthening or deformation. All contact with sharp or angular objects or material must be avoided. Hoses must be stored in a dry place in storage boxes wherever possible. Flexible hoses that are coiled up should be stored flat and preferably not stacked. In cases where this is impossible, the height of stacks should be limited so that the items at the bottom of the stack are not deformed. Heavier items should be placed at the bottom and lighter items should be placed at the top. The coil must be at least equal to the minimum curvature radius specified by the product manufacturer or standards. Hanging coiled

hoses from spikes or hooks is not recommended. Flexible hoses that are supplied in lengths should be stored flat without folds.

### 2.9 Rodents

Flexible hoses must be protected from rodents and suitable precautions should be taken if there is any risk.

### 2.10 Removal from storage

Precautions should be taken to ensure that the hoses requested are in perfect condition and are the correct hoses for the required use. Therefore, the ability to identify the different hoses stored is essential. Furthermore, and particularly in the case of flexible hoses that have been in storage for a long period of time, the metal connection elements should be checked to confirm they are correctly fitted.

### 2.11 Return to storage

Hoses that have been removed from service must be emptied of the substances they have carried before being returned to storage. Special care must be taken with items that have transported chemical, explosive, inflammable, or corrosive products. After cleaning, and before storage, their condition and suitability for later use must be checked.

### 2.12 Cleaning

Cleaning with brushes, sponges or cloths must be carried out with soap and water or surfactant based products. Metal brushes and abrasive, pointed or sharp instruments must not be used and the use of solvents should be avoided.

## 3. RULES FOR USE

### 3.1 Handling

Flexible hoses should always be handled with some minimum precautions. For example: they should not be scraped over sharp or abrasive surfaces, subjected to impacts or cut, deformed or squashed by vehicles.

Heavy flexible hoses supplied in lengths should be transported appropriately, especially when being lifted.

### 3.2 Impermeability test

A pressurized hydraulic test is recommended after fitting the metal connectors to ensure they are in good condition (no leaks and connector has not moved on the hose). The test pressure value is usually indicated by the hose manufacturer if it is not specified by test regulations or by standards.

If in doubt, check with the manufacturer.

### 3.3 Elimination of static electricity

The manufacturer's advice should be strictly followed when considering electrical conductivity requirements and a check should be carried out after installing the connections.

### 3.4 Fixed installations

Flexible hoses used for fixed installations must be connected using the appropriate fixing device wherever possible. This device should not hinder normal variations in the flexible hose when under pressure, such as longitudinal or diametric variations and/or torsion. When used under special conditions whether mechanical pressurized, vacuum or geometric, the manufacturer should be consulted.

### 3.5 Moving parts

When flexible hoses need to be installed on moving parts, care must be taken to ensure that the motion does not cause the hose is not be subjected to impacts, blockages or friction and that the hose is not forced into abnormal curvatures, folds, traction or torsion.

### 3.6 References

Apart from some fields of use where special standards exist, all flexible hoses must be subjected to regular controls to ensure their suitability for continued use. In particular, attention needs to be paid to the condition of the connections and to the appearance of certain faults indicating hose degradation, whether due to normal ageing or to damage attributable to improper use or accidents during maintenance.

It is therefore particularly important to check for the appearance of:

- Cracks, scratches, breaks or tears in the coating that reveal the structure
- Deformities, blisters, or swellings that appear when the hose is subjected to pressure
- Leaks

These faults require the affected hose to be replaced. In certain areas of use, and for safety reasons, there may be a use-by-date which will be indicated on the marking of the flexible hose. This use-by-date must be observed even if the hose shows no apparent signs of wear and tear.

### 3.7 Repairs

Repairing hoses is not generally recommended. However, in the particular cases when hoses can be repaired, the manufacturer's recommendations must be strictly adhered to and a pressure test must be carried out after the repair. If there is any deterioration as a result of a cut at one end and if the length of the remaining hose is in good condition, then the hose can be repaired by cutting away the defective part.

## PART B: ADDITIONAL RECOMMENDATIONS

In addition to the general recommendations in part A there are some other particular points that should also be noted.

### 1. BENDING RADIUS/ABRASIVE PRODUCTS

In order to obtain the optimal useful life, flexible hoses must be kept as straight as possible, avoiding any unnecessary curvature. The widest possible bending radius should therefore be used, since a radius that is too small will cause unwanted turbulence inside the hose. Good electrical conductivity will also need to be tested.

This is ensured in these hoses with the effective discharge of the static electricity ge-

nerated by rubbing the friction of transported particles against the wall of the hoses. With regard to connections, it should be ensured that exterior connections are not subjected to abrasion. However, connections included in the hoses avoid the formation of turbulence that, as already mentioned, can cause increased and unsuitable consumption.

### 2. CORROSIVE OR AGGRESSIVE PRODUCTS

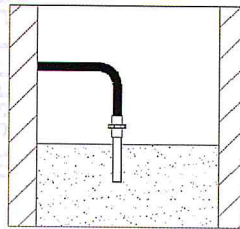
This point refers specifically to acids, bases, solvents, agro pharmaceutical products and other chemical products. Should these products not appear in the list of compatible products specified in the technical documentation or if the temperature and concentration limits do not fall within acceptable parameters, the hose manufacturer should be consulted. Fluids should not be allowed to stagnate in the flexible hoses, especially in the case of solutions or emulsions, as the resulting decantation can cause concentrations that exceed the admissible limits. Cleaning and rinsing should be performed after each use in order to prevent this phenomenon. It is essential that all necessary technical precautions are taken in order to avoid leaks caused by the accidental explosion of the flexible hoses.

### 3. INFLAMMABLE PRODUCTS

This family of products is comprised in part by liquid hydrocarbons (essences, petroleum, and kerosene) or gaseous hydrocarbons (LPG). Most countries have regulations governing the storage and transport of these products. In the field of flexible hoses, attention must be paid to the regulations concerning electrical resistance, as well as the nature and frequency of controls for checking suitability for use over time. In the case of hydrocarbons, care must be taken to ensure that the percentage of aromatic hydrocarbons (benzene, toluene, xylene) falls within the limits established by the flexible hose manufacturers.

## BENDING RADIUS

### RECOMMENDED



### NOT RECOMMENDED

