
**Rubber and plastics hoses and hose
assemblies — Guidelines for selection,
storage, use and maintenance**

*Tuyaux et flexibles en caoutchouc et en plastique — Lignes directrices
pour la sélection, le stockage, l'utilisation et la maintenance*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This third edition cancels and replaces the second edition (ISO 8331:2007), which has been technically revised. The following principal changes have been made:

- [Subclause 3.2.2](#): reference to ISO 2230 for long-term storage was deleted and recommendations for bulk hoses and hose assemblies were added;
- [Subclause 3.2.3](#): “hose assembly” was added;
- [Subclause 3.2.4](#): requirement for polyurethane products was added;
- [Subclause 4.3](#): the requirement to examine the lining of steam hoses before re-use after a storage period was added;
- [Subclause 4.9](#): reference to ISO/TS 17165-2:2013, Clause 9 was added and 9.2.2 of that Technical Specification was copied to specify conditions for long-term storage of hydraulic hoses;
- Bibliography: reference to the OCIMF Guide was updated.

Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance

1 Scope

This International Standard sets out recommendations designed to maintain rubber and plastics hoses and hose assemblies, prior to use, in a condition as close as possible to the condition they were in when they were received and to obtain the expected service life.

NOTE It is intended that this International Standard be used in conjunction with any applicable national statutory regulations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 2230, *Rubber products — Guidelines for storage*

ISO 8031, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity*

ISO/TS 17165-2:2013, *Hydraulic fluid power — Hose assemblies — Part 2: Practices for hydraulic hose assemblies*

3 General recommendations

3.1 Selection criteria

It is in the best interests of the user to select hoses or hose assemblies complying with national or international standards whenever such standards exist for the intended application. For applications outside the scope of such standards, needing special requirements or for which the necessary information is not available, the hose manufacturer or trade association should be consulted.

The following points should be taken into consideration when selecting a hose or hose assembly for a specific application:

- a) Operational environment:
 - ambient temperature;
 - atmospheric conditions;
 - contact with chemically aggressive liquids;
 - contact with other deleterious media.
- b) Media conveyed:
 - liquid;
 - gaseous;

- solids;
- combinations of the above.
- c) Method of conveyance:
 - pressure (including rate of flow);
 - suction (including rate of flow);
 - gravity (including rate of flow);
 - assisted (mixture of solid/fluid, solid/air).
- d) Operating conditions:
 - pressure and temperature of product conveyed;
 - frequency of use.
- e) Installation:
 - degree of curvature (minimum bend radius);
 - vibration of system;
 - risk of damage by impact and abrasion;
 - use of correct type of connection;
 - type of movement and frequency.

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3.2 Storage conditions

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3.2.1 General

During storage, especially for long periods, and when hoses and hose assemblies are exposed to certain adverse influences, the physical properties of hoses and hose assemblies can undergo changes that may result in them no longer having the optimum characteristics corresponding to their application when they are put into service. The storage conditions should be such as will offer maximum protection and minimize deterioration of the articles during storage.

3.2.2 Storage period

The storage period should be kept to a minimum. Rotation of stock is therefore essential and the “first-in first-out” rule applied. For long-term storage, the following maximum storage periods are recommended:

- For bulk hoses (without fittings attached) maximum 4 years
- For hose assemblies maximum 2 years

These two periods can be interpreted as consecutive for a maximum storage duration of 6 years (4 years as bulk hose + 2 years as hose assembly).

3.2.3 Temperature

The storage temperature should be below 25 °C and articles stored away from direct heat sources. Storage above 25 °C may shorten the life of the hose or hose assembly. Articles should not be subjected to temperatures over 50 °C or below – 30 °C or to abnormal fluctuations in temperature during the storage period. See ISO 2230 for information on the effect of higher and lower temperatures on the storage time.

3.2.4 Humidity

The relative humidity should not exceed 70 %, or 65 % for polyurethane hose products.

3.2.5 Light

The articles should be stored in a dark place away from sunlight and strong artificial light. If the storage area has windows or glazed openings, they should be obscured with red, orange or white coverings.

3.2.6 Ozone

Due to the harmful effect of ozone on rubber-based articles, storage areas should not contain equipment capable of generating ozone, for example mercury vapour lamps or tubes, high-voltage electrical equipment, electric motors or other equipment likely to cause sparks or electrical discharges.

3.2.7 Environment

Articles should not be placed in contact with certain products or exposed to their vapours, particularly solvents, oils, greases, acids, disinfectants, etc. Some metals, such as copper, iron and manganese, have a harmful effect on certain rubber compounds.

3.2.8 Sources of heat

Articles should not be stored in close proximity to heat sources. The distance between the articles and the heat sources should be sufficient to ensure compliance with the recommendations of [3.2.3](#).

3.2.9 Electric and magnetic fields

Storage areas should not be in the vicinity of equipment that may generate electric or magnetic fields, as variations/fluctuations in such fields could induce currents in metallic joints, which in turn generate heat.

3.2.10 Method of storing

Articles should be stored in such a way that they are not subjected to excessive stress, elongation or deformation. Contact with sharp, pointed or abrasive objects or surfaces should be avoided, and storage racks should be provided whenever possible.

Coiled hose or hose assemblies should be stored flat and preferably not stacked. When stacking is unavoidable, the height of the stack should be restricted so that the articles at the bottom do not suffer permanent deformation. The hanging of coils on pegs is not recommended. Hoses and hose assemblies supplied in straight lengths should be stored flat and unbent. End caps should be kept on hoses supplied with them.

3.2.11 Rodents

Articles should be secure from attack by rodents, and adequate protection should be provided if there are any risks.

3.2.12 Issue from storage

Care should be taken to ensure that articles issued from stock are in their correct condition and correspond to their intended application. Identification of the different types in stock is essential. Hose assemblies which do not have permanent end fittings, i.e. those with clipping/clamping arrangements that can be adjusted, should be checked to ensure that the end fittings are secure.

3.2.13 Return to storage

Before being returned to storage, articles which have been withdrawn from service should be drained of the substance they have been used to convey. Special care should be exercised with hoses that have been used to transport chemical, explosive, flammable or corrosive products. After cleaning and before return to storage, the articles should be examined to establish their suitability for continued use.

3.3 Use and maintenance

3.3.1 Handling

Hoses and hose assemblies should always be handled with care. They should not be dragged over sharp or abrasive surfaces. They should not be subjected to kinking or flattening, for example by being run over by vehicles.

3.3.2 Pressure

Articles should not be subjected to pressures, including surge pressures, in excess of the specified maximum working pressure.

3.3.3 Temperature

Articles should not be used at temperatures, either conveyed-product temperatures or environmental temperatures, outside the range specified or recommended by the manufacturer.

3.3.4 Products conveyed

Hoses and hose assemblies should only be used for conveying the products for which they are designed. If there is doubt regarding the suitability, the hose manufacturer should be consulted. When potentially dangerous (for example toxic, corrosive, explosive or flammable) products are being conveyed, precautions to minimize the effects of spillage due to leakage should be taken and it is recommended that, when not in use, hoses and hose assemblies should not remain filled.

3.3.5 Environment

Hoses and hose assemblies should not be used in environments other than those for which they were designed. If there is doubt regarding the suitability of the environment, or if unusual or variable conditions are experienced, the manufacturer should be consulted.

3.3.6 Bending radii

Hoses and hose assemblies should not be used with bends less than the minimum bend radius specified or recommended by the manufacturer as this may restrict the passage of the product being conveyed or damage the hose assembly. Bends or kinking adjacent to end fittings should be avoided as continued bending in the same area may fatigue the reinforcement and lead to premature failure.

3.3.7 Torsional stress

Hoses and hose assemblies are not designed to operate in torsion. Installation should be performed so that the relative motions of machine components produce bending of the hose and eliminate twisting.

3.3.8 Tensile stress

Only when hoses and hose assemblies are specially designed to do so may they be subjected to tensile stress. If the hose standard does not address suitability, then the hose manufacturer should be consulted.

3.3.9 Vibration

Vibration subjects hoses and hose assemblies to fatigue and heating, particularly around the connections, which can lead to premature failure. It is important to ascertain from the hose product standard or manufacturer whether a hose assembly is designed to withstand vibration.

3.3.10 Assembly of end fittings

Before proceeding with the assembly, determine the compatibility of the fitting, the hose and the method of installation. In case of doubt, the hose manufacturer should be consulted.

Fittings should be free from sharp edges, and the dimensions of hose inserts, ferrules, etc., should be such as to ensure an effective seal when correctly fitted. Swaging dimensions and clip torque loads should be controlled, as insufficient or excessive swage dimensions will lead to premature failure of the assembly. To facilitate insertion of the fitting into the hose, the use of plain or soapy water is recommended. Do not use products containing oil, grease or solvents unless specified by the hose manufacturer in the assembly instructions. Care should be taken not to twist or kink the hose when inserting the fitting.

3.3.11 Leakage

After the attachment of the end fittings, it is recommended that the assembly undergo a hydrostatic proof test, to the specified proof pressure of the hose, to verify the hose fitting installation, i.e. freedom from leaks and no evidence of slipping between the fitting and the hose. In the absence of statutory regulations or other standards, carry out testing in accordance with ISO 1402.

3.3.12 Electrical properties

When there are requirements regarding electrical properties of the hose or hose assembly, it is recommended that they be ascertained in accordance with ISO 8031. Continued compliance should be established by testing at regular intervals in use.

3.3.13 Fixed installations

Hoses and hose assemblies used in fixed installations should, whenever possible, be supported by adequate clamping. Care should be taken to ensure that the clamps do not create excessive hose distortion during pressure/suction, i.e. dilation, change in length or expansion.

3.3.14 Moving parts

When the hose or hose assembly is used to convey fluid between moving parts or components, the installation needs to ensure that the length is adequate, without being excessive, and that any movement does not result in the hose being subjected to shock loading, pinching, abrasion, bending smaller than the minimum bend radius or tensile/twisting stress.

3.3.15 Marking/identification

If marking additional to that specified in the hose product standard, such as further identification, is required, it is recommended that this be done by the application of adhesive tape bearing the required marking. Marking directly on the hose is also possible provided the hose cover compound is compatible with the printing inks used to produce the marking.

3.3.16 Maintenance

Hose and hose assemblies, excluding those for which there are regulations, standards or contractual requirements, should be subjected to periodic testing/inspection to establish their suitability for continued use. Particularly attention should be paid to the condition of the connections and adjacent areas and to the appearance of defects indicative of deterioration of the hose due either to normal ageing or to damage attributable to abnormal service conditions, maltreatment or accidents during use.