Recommendation for the storage and maintenance of unvulcanized rubber compounds and rubber products

In order to avoid impairments in the processing of our products and to ensure a long applicability, we would like to give our customers the necessary information with this recommendation. More detailed instructions are found in the standards ISO 2230 “Rubber products - Guidelines for storage” and DIN 7716 “Instructions for the storage of elastomers”.

Guideline for unvulcanized rubber compounds

Unvulcanized rubber compounds have a limited shelf life due to the raw state. The respective expiration date you will find on delivery of the mixture accompanying card. At the end of this period, the compound may not be unusable, but a processability test should be carried out before use. By careful investigations the processability of the rubber compound, for the, in the sampling operation specified application within the specified shelf life is ensured. Provided that the following recommendations of the conditions for transport and storage are followed and recorded.

The storage conditions directly influence the processability of rubber compounds. Environmental influences such as the effects of heat, cold, moisture and light have a major impact on further processing and quality. While storing our products, the standards ISO 2230 and DIN 7716 must be observed. Since different transport and storage conditions adversely affect the durability, we recommend the following guidelines.

- Goods handling should be handled according to the first-in, first-out principle (FIFO).
- The storage area should be cool, dry, dust-free and protected from the effects of light (especially direct sunlight and strong artificial light with a high proportion of ultraviolet radiation). We recommend using a suitable cover.
- In order to avoid large temperature fluctuations and air currents, outdoor storage is not recommended.
- The storage room temperatures should be between + 15 ° C and + 25 ° C.
- In order to avoid condensation effects, a storage humidity of less than 65% is recommended.
- Fuels, lubricants, acids, disinfectants, solvents or other chemicals must never be stored in the storage room to avoid contact with rubber compounds.

Please note:
Storage times at temperatures above + 25 ° C can cause aging or scorching. On the other hand, temperatures lower than + 15 ° C can lead to a stiffening of the rubber compound. Both scenarios shorten the shelf life and a guarantee of process capability is no longer given!
The optimum storage temperature of + 15 ° C to + 25 ° C are not used for ECO, ACM, AEM and CR (restricted) mixtures. Blends based on this rubber are very sensitive to temperature, so we recommend a max. Storage temperature of 20 ° C, if the specified on the mixture accompanying card durability is to remain.

Recommendations for storage times based on results of storage studies of our compounds:

Storage temperature	**Storage time**
> 25°C	max. 5 days
20°C - 25°C	max. 14 days
< 20°C	max. 28 days

Detailed general guideline for the storage and maintenance of rubber products

General
All materials of any containers, covering or wrapping should be free from substances having a degrading effect on the rubber. Such as copper, naphthenates, creosote preservatives or films containing softening agents. Materials, unassembled components and assemblies containing rubber components packaged in accordance with clause above should be stored indoors under the conditions given below.

Packaging

General
Unless otherwise specified in the appropriate product specification, rubber products should be: enclosed in individual sealed envelopes or enclosed in individual sealed pockets in a multiple envelope provided that they can be removed without affecting the sealing of the remainder of the items in the package or if it is not possible to package the items in either of these ways, suitably enclosed or wrapped so as to prevent free access of air.

NOTE
It is advisable that packaging be completed as soon as is reasonably practicable after curing in the case of a vulcanized rubber product.

The packaging should be carried out in an atmosphere in which the relative humidity is not greater than 65 % and under conditions that will ensure freedom from contamination by dust, oil, grease, etc.
If it is necessary for rubber components to be packed in assembly sets, the components should be retained in them original identifying envelopes within the main package. No part should be tied or tagged in such a way as to cause damage.

Packaging materials

All material of any containers, covering or wrapping should be free from substances, such as copper naphthenates or creosote preservatives, having a degrading effect on the rubber.
Heat-sealable opaque materials should be used unless it can be demonstrated that this is not practicable in the circumstances or would distort the packaged product.

NOTE
Some suitable materials are polyethylene-coated craft paper, aluminum foil/paper/polyethylene laminate and opaque polyethylene film.

Plasticized Polyvinylchloride (PVC) film, or any other film containing plasticizer, should not be used in direct contact with rubber. If for any reason a transparent or translucent material is used, it should be over-wrapped with an opaque material. If polyethylene is used as a single wrapping, it should be not less than 0,075 mm thick (determined in accordance with ISO 4591).

For some products, antistatic plastics wrapping may be required. Where there is serious risk of ingress of moisture, aluminum foil/paper/polyethylene laminate or other
similar means of protection should be used to ensure protection from ingress of moisture.

Storage conditions

General

Materials, unassembled components and assemblies containing rubber components packaged in accordance with the guideline before should be stored indoors under the conditions given below.

NOTE
It is advisable that the physical environment in which rubber is stored is given due consideration, as thermoplastics tiles and painted surfaces may become permanently stained through migration or volatilization of compounding ingredients such as
anti-degradants or process oil.

Temperature

The storage temperature should be below 25 °C and products should be stored away from direct sources of heat such as boilers, radiators and direct sunlight. If the storage temperature is below 15 °C, accuracy should be applied during handling of stored products as they may have stiffened and become susceptible to distortion if not handled carefully. The temperature of products taken from such low-temperature storage should be raised to approximately 30 °C throughout their mass, before the products are used.

Humidity

The relative humidity should be such that, given the variations of temperature in storage, condensation does not occur. In any event, the relative humidity of the atmosphere in storage should be less than 70 % or, if polyurethanes are being stored, less than 65%.

NOTE

- Air with 75% RH at will have a dew point of approximately 11 °C.
- Air with 75% RH at will have a dew point of approximately 16 °C.

- Air with 65% RH at will have a dew point of approximately 9 °C.
- Air with 65% RH at will have a dew point of approximately 13 °C.
- Air with 50% RH at will have a dew point of approximately 0 °C.

Light

Rubber should be protected from light sources, particularly direct sunlight or intense artificial light having a high ultra-violet content.

NOTE
It is advisable that any windows of storage rooms be covered with a red or orange coating or screen.

Radiation

Precautions should be taken to protect stored products from all sources of ionizing radiation.

Ozone

As Ozone is particularly deleterious to rubber, storage rooms should not contain any equipment that can generate ozone. Combustion gases and organic vapors should be excluded from storage rooms, as they may cause Ozone via photochemical processes.

NOTE
Combustion gases should be considered separately. While they are responsible for generating ground-level ozone, they may also contain unburned fuel which, by condensing on rubber products, can cause additional deterioration.

Deformation

Rubber should be stored free from tensions and compressive stresses or other causes of deformation. Where products are packaged in a strain-free condition, they should be stored in their original packaging.

NOTE
It is advisable that rings of large internal diameter are formed into three equal superimposed loops to avoid creasing or twisting. It is not possible to achieve this condition by forming just two loops.

Contact with liquid and semi-liquid materials

Rubber should not be exposed to liquids or semi-liquid materials (e.g. petrol, greases, acids, disinfectants, cleaning fluids) or their vapors at any time during storage, unless these materials are an integral part of the product or the manufacturer's packaging. When rubber products are received coated with their operational media, they should be stored in this condition.

Contact with metals

Certain metals and their alloys (particularly copper and manganese) are known to have deleterious effects on some rubber materials. Rubber should not be in contact with such metals except when bonded to them. In any case rubber should be protected by wrapping in or by separation with a layer of suitable material, e.g. paper or polyethylene.

Contact with dusting powder

Dusting powders are only be used for the packaging of rubber items in order to prevent blocking (see ISO 5978). In such instances, the minimum quantity of powder to prevent adhesion must be used. Any powder used must be free from any constituent having a deleterious effect on rubber or the subsequent application of rubber.

Contact between different products

Contact between products made from rubbers of different compounds should be avoided.

Products with rubber-to-metal bonds

The metal part of rubber-to-metal bonded products should not contact the rubber of other products. Any preservative used on the metal should comply with the product specification.

Proofed fabrics and rubber sheeting

Proofed fabrics and rubber sheeting less than 1 m^2 in area or less than 2 m in length should be stored flat, ideally with suitable material layers interleaved. Larger areas and longer lengths of material should be rolled, with the layers interleaved with a suitable material.

Cleaning

Vulcanized rubber products must be cleaned carefully with preferably soap water. The use of scouring agents, sharp edges and solvents, as trichloroethylene, carbon tetrachloride or hydrocarbon fluids, is forbidden.

Inspection, testing and recording of data during storage

Recording

A record should be kept of the test characteristics of items stored. Such records should include an indication of the acceptable confidence interval of the mean for each parameter tested where the test conducted provides a numerical result.

NOTE

In this regard, reference to ISO 2602 and ISO 3207 is advised. A record should also be kept of the following:

- the quantity of each item stored, the date of initial packaging, and the date it was put into store;
- the date of any subsequent repackaging;
- the manufacturer's batch number;
- the quantity of items that are a representative sample of those items.

Inspection

Inspection before extension storage

Before any items are to be stored for any extension storage period, representative samples of each type should be selected for inspection at the end of the appropriate initial storage period. Items should not be laid on concrete floors or other rough surfaces or in areas susceptible to contamination by grit. Inspection should be in accordance with the relevant product specification or, where the relevant specification does not make such provision, the minimum visual inspection procedures should apply.

Visual inspection

Inspect each of the items in the representative sample for the following:

- permanent distortions, such as creases or flats;
- mechanical damage, such as cuts, tears, abraded areas or delaminated plies;
- surface cracking when viewed under a magnification of 10x;
- changes in surface condition, such as hardening, softening or tackiness.

Testing

Providing that, when inspected, items should be tested to ascertain that their relevant performance characteristics are within the acceptable confidence limits recorded above.
Testing to demonstrate that the product is serviceable should be carried out in accordance with the appropriate product specification for the item concerned.

Storage periods

Assessment at the end of the initial period

If, following the visual inspection procedure or following the test procedures, the items are not satisfactory, they should not be released into any extension storage period. If the items are satisfactory and are placed into an extension storage period, the provisions above should apply and, in addition, a record should be kept of the date of commencement of the initial storage as well as the date of commencement of the extension storage period.

Extension storage period

Items admitted into an extension storage period should be inspected and tested at or before the expiry of the extension storage period before they are put into service or admitted to any further extension storage period. The duration of the storage periods, both initial and extension, will normally be specified in the appropriate specification.

Duration of storage

Unless otherwise specified in the product specification, the initial storage period and extension storage periods should be those given in ISO 2230.
NOTE
Storage periods shorter than those tabulated in ISO 2230 may be advisable for some group A rubber products of less than 1,5 mm thickness and for group A cellular rubbers (as well as for items packaged and/or stored under conditions other than those given.

Repackaging

If products are removed from storage for inspection or testing or any other purpose and are subsequently to be returned to storage for a further period, they should be repackaged in accordance with ISO 2230 and the date of repackaging recorded on the container.

Compounds
rubber solutions

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