

Technical Measures & Storage Conditions

When “green” rubber, whether oil-extended or not, is stored under unfavourable conditions, its physical and/or chemical characteristics may change to some degree. Eventually, this may render the rubber unsuitable for use. This may result in changes in the processing behaviour and/or in the properties and surface of the end product. Such changes, due to environmental influences, may be caused by one, or by a combination of factors. The most important of which are the effects of oxygen, ozone, light, temperature and humidity. Since the harmful effects of these factors can be minimized by a careful choice of the storage conditions, we would like to draw your attention to a number of important measures to be taken storing “green” rubber. The guidelines given below relate to the principal storage conditions of the standard delivery forms of our Keltan® EP(D)M.

Temperature & humidity

For storage over a long period of time the recommended maximum temperature is 30 °C to ensure the quality for the full duration of the shelf life period. Storage conditions above 30 °C will lead to a faster consumption of the stabilization package and thus the product quality may deteriorate before the shelf life period expires. Pre-heating of the product (typically between 50-60°C) for up to 1-2 weeks to facilitate better mixing has no noticeable effect on the ageing of the product.

EP(D)M in its unvulcanised state tends to crystallize partially at temperatures lower than 15 °C. As a result, EP(D)M that has been stored at temperatures below 15 °C can therefore give rise to mixing problems, resulting in the presence of undispersed polymer particles in the final products. This is most likely to occur with crystalline grades, but may also be observed with amorphous grades. The minimum storage temperature should preferably be 15 °C. Some grades may retain partial crystallinity even at a temperature above 15 °C. In those cases the product has been produced as a friable bale. This friability ensures ease of mixing and prevents undispersed polymer particles in the compound and final article. If a storage temperature below 15 °C cannot be avoided it is recommended to transfer the “green” rubber prior to use to a suitable place, which has a temperature of at least 15 °C, and allow the material enough time to recover from potential crystallization before further processing.

Humid conditions should be avoided, since moisture can influence the processing and curing behaviour of the material. Relative humidity should preferably be kept below 65%.

Light

Daylight, but also artificial light with a substantial content of UV-light, may adversely affect the stability of “green” EP(D)M rubber. Depending on the grade and the exposure time, chain rupture and/or cross-linking may occur. In view of this, exposure to light should be restricted to a minimum. In some cases (e.g. direct sunlight) exposure times of 2-4 hours of light (UV) exposure can result in gelled product. Keltan® EP(D)M is shipped in boxes which, when kept closed, adequately protect the material against light. Once taken from the box it is highly recommended to use black covers to protect the material during storage. It should be emphasized that oil-extended grades, are more susceptible to UV initiated degradation than other grades.

Oxygen and NO_x

When possible, “green” EP(D)M rubber should be protected from excessive air circulation and should not be stored near electrical equipment that could be a source of ozone. Likewise, the storage of Keltan® EP(D)M in areas that are continuously occupied by fuel operated (forklift) trucks may lead to exposure to elevated NO_x levels. This may shorten the shelf life considerably.

Warehousing and Handling

The storage area should be dry and properly ventilated. Storage outdoor should be avoided. Keltan® EP(D)M rubber should be stored in an area which meets the common standards of cleanliness, even though the products are wrapped in PE or EVA-foil or PE-bags. All direct contact with foreign materials and with other kinds of rubber should be avoided. It is recommended to keep the material in its original packaging until the moment it is about to be used.

Depending on the construction of the packaging, it is possible to stack the boxes with Keltan® products. This should be done very carefully, because otherwise, there will be risk of damaging the packaging or causing a safety hazard. Boxes that are to be stacked should be properly

aligned on top of each other. Never stack damaged packaging. A second condition for safe stacking is a clean, level and stable floor for the packaging to be stored on. A third condition for safe stacking is the control of relative humidity in the storage area. At relative humidity (RH) in excess of 80% (average RH over a day) may reduce in strength especially for the corrugated cardboard packaging. The following table shows the maximum advised stack height of the different forms of packaging.

Table 1 – Advised Maximum Stack Height

Packaging type	Maximum Stack Height
Wood cardboard box pallets	3 units (2 on top of 1)
Pallets with corrugated cardboard box	2 units (1 on top of 1)*
Pallets with individual corrugated cardboard boxes	2 units (1 on top of 1)

* For cardboard boxes produced in Geleen, Triunfo and Changzhou, a 3 high (2 on top of 1) stacking is only possible with: Intact packaging, Straight stacking and Relative Humidity no higher than 80% (day average).

These stack heights are advised stack heights and we strongly recommend that for each individual storage location of Keltan® EP(D)M, the safety of stacked storage is reviewed before implementing. Local conditions of the warehouse and/or warehouse operator skills in aligning the skids on top of each other may vary from location to location.

Some products have high flow behaviour at room temperatures. It is important that these products are kept within their original packaging until final usage. Removing sidewalls of the packaging of these products might lead to extreme cold flow of rubber, resulting into strong bale deformation. This high cold flow concerns especially products with a polymer Mooney viscosity below 30.

Stock Rotation

"Green" EP(D)M rubber should not be stored for any longer than strictly necessary. It is therefore recommended to use the "FI-FO" (First in-first out) stock rotation system.

Shelf Life

Under the conditions described in this instruction the shelf life of Keltan® EP(D)M from Geleen, Changzhou, Marl and Triunfo is guaranteed for 3 years after production. For Keltan® EP(D)M from Orange, the shelf life is guaranteed for 2 years after production. This is clearly indicated for each grade in the Global Sales Specifications available via <https://connect.keltan.com>.

Version and validity

This document was issued at November 18, 2016 and replaces earlier versions.



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