

Silica Gel

What is Silica Gel?

Kirkside Silica Gel is a naturally occurring substance that uses an adsorption and mechanical reaction to absorb humidity at various rates. Each granule of silica gel may be considered as a vast "honeycomb" of pores. These pores give the silica gel an internal surface area estimated to be 800m² for every 1 gram of material. This surface attracts moisture and provides the silica gel with its outstanding capacity for water.

In its natural state silica gel is white in colour. Most users of silica gel require it to be "indicating". Indicating is when a colour (in this case blue) is added which changes the colour to pale pink when the silica gel has absorbed its capacity of water. This enables the user to see when the silica gel needs replacing.

Kirkside Silica Gel can be partially regenerated by heating the beads between 110 degrees C and 220 degrees C and allowing the water to be driven out of the beads. It is important to understand that the beads will however suffer a reduced effectiveness by around 25% each time they are regenerated. We do not guarantee the effectiveness of regenerated silica gel, and as such, do not recommend the practice.

How do I use Silica Gel?

The most effective way of using Silica Gel is by suspending the material throughout the container you wish to protect. If this is not possible, then place the material intermittently throughout the container, preferably near the top, as humidity rises.

The basic rule for estimating the quantities you will require is as follows. At a temperature of 25 degrees C and a relative humidity of 60%, one cubic metre will contain 30g of moisture, which requires 100g of Silica Gel. Due to the fact that the temperature and relative humidity are not constants, we recommend that you use twice the amount (200g) as a precaution. If you require more detailed information on estimating quantities, the following page gives a more detailed explanation of how to allow for other factors that may affect your estimates.

Material	Thickness	R (g/m ² per 24 hours)
Aluminium Foil	250um	0.5
	90um	1.0
Polyvinyl Chloride Films	13um	3.0
Polyethylene Films	125um	4.0
Polyethylene Films	50um	10.0
Polyethylene Films	25um	20.0
Polyester	60um	11.0
Polypropylene	50um	2.3

Calculating Silica Gel Requirements

The amount of silica gel required to give protection to different types of packages under various conditions can be calculated from the formulae listed below:

$$\begin{aligned} W &= 40 ARM + DF \text{ (for tropical climates)} \\ W &= 11 ARM + DF \text{ (for temperate climates)} \\ W &= 170V + DF \text{ (for hermetically sealed packages)} \end{aligned}$$

Where:

W = Weight in grammes of Silica Gel.

A = Area in m² of the Moisture vapour barrier

R = Moisture vapour transmission rate of the barrier in grammes per m² per 24 hrs.

M = Maximum time in months of storage.

V = Volume in m³ of the air inside the barrier (generally volume of the sealed container).

D = Weight in grammes of blocking, cushioning, and other packaging materials inside the barrier (including cartons)

F = Factor depending on type of dunnage, where:

F = 1/6 for timber with moisture content of higher than 14%

F = 1/8 for felt, cardboard, and similar packaging materials.

F = 1/10 for timber & plywood with moisture content of less than 14%.

What quantities is Silica Gel Available in?

Kirkside Silica Gel is available in bead form (2-5mm) in 25kg Drums, or in prepacked sachets from 1g to 500g. We can also pack into quantities that meet your requirements.

How should I store Silica Gel?

Containers of Silica Gel must be kept sealed and stored in a clean, dry environment of and even temperature, preferably between 0 and 35 degrees C. Stored correctly the unopened container will have excellent shelf-life and maintain absorption for up to 3 years.

Safety Requirements?

Silica Gel in bead form is non-hazardous, non-toxic and chemically inert. Care should be taken to avoid inhalation of dust in any form, and to avoid contact with the skin. In the event of spillage, material can simply be disposed of as normal waste. Please read the Material Safety Data Sheet (MSDS) for further information.

Further Information

To obtain the optimum performance from **Kirkside Silica Gel**, the articles being protected must be placed in a properly designed pack in which the silica gel can create a low humidity environment.

In a desiccated pack the article being protected is usually packed in or supported by various materials such as wood or paper (normally termed "dunnage"). These are enclosed in a sealed barrier film, eg. Polyethylene. Preferably with low moisture vapour transmission rate (R).

During transport and storage, moisture will accumulate in the pack from two sources. It will be emitted from the dunnage, and will also enter slowly through the barrier at a rate depending on its type and thickness and the external conditions. Moisture vapour transmission rates for a number of barrier materials are listed on the following page. These values have been determined under tropical conditions of high humidity.

Desiccant Units

In some countries desiccant units are used to describe the absorption capacity of silica gel. In DIN 55473 a desiccant unit is described as the amount of desiccant which in equilibrium with air at 23 degrees C +/- 2 degrees C absorbs the following amounts of water vapour:

Minimum 3.0g at 20% relative humidity

Minimum 6.0g at 40% relative humidity

From the isotherm shown in Figure 1 it can be seen that 25g of **Kirkside Silica Gel** will absorb the stated amount of water vapour although a desiccant unit of silica gel normally weighs between 28g – 30g.