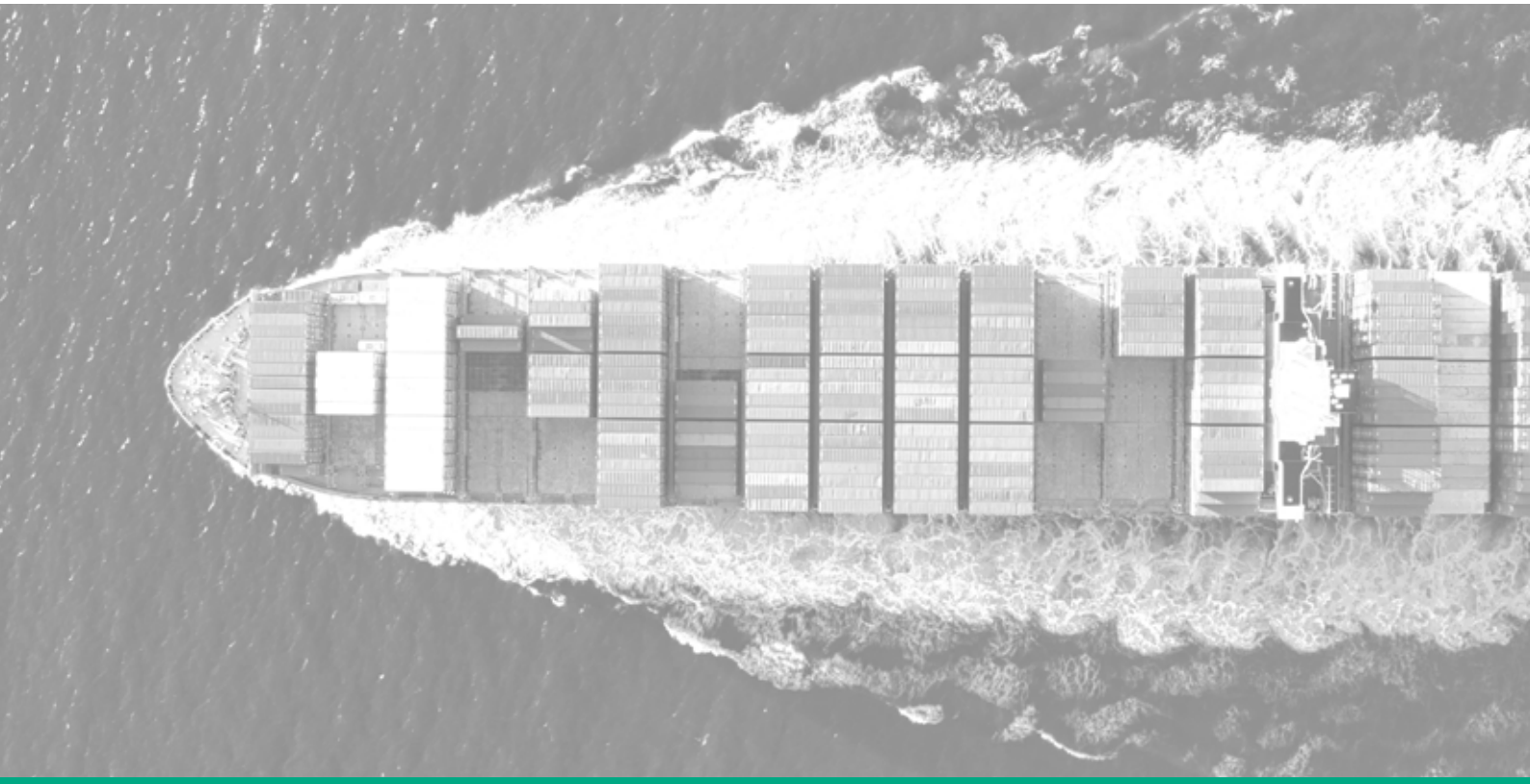
PROTECTION

How to protect cargo from damage by moisture during shipping?



YOU SHIP
WE PROTECT

CARGO PROTECTION SYSTEMS

j2servid.com

Introduction

Studies show that approximately 10% of container shipments are affected by moisture damage, with the economic losses that this entails.

In addition, there is a wide range of side effects that must be considered: such as the environmental impact of cargo waste, increased insurance costs, the time it takes to make claims and damaged customer relationships.

The positive side is that there are high-quality solutions to protect cargo against container condensation.

To help you deal with this problem, please refer to the following guide where we describe the causes of this problem and what you can do to protect your goods.

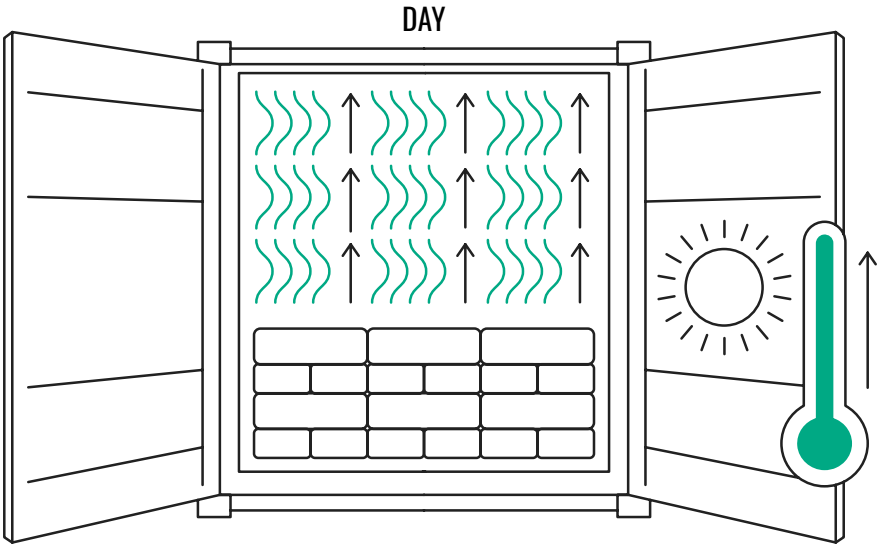
1 I loaded my container dry and when I opened it the load was wet. Where did this moisture come from?

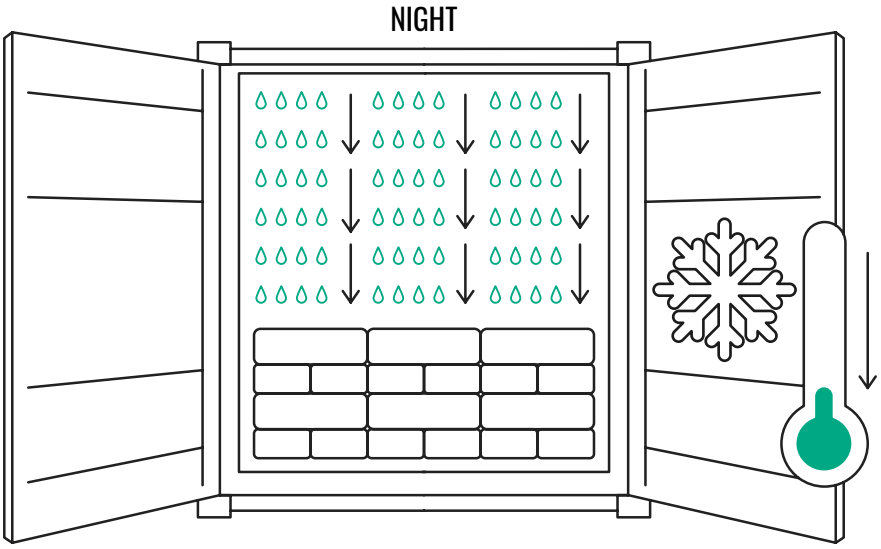
When a container is loaded for shipping goods, it is full of moisture, which can also be found in the air, in the cargo, in the packaging, the pallets and on the wooden floor of the container.

As the temperature begins to rise, moisture evaporates into the air, increasing the relative humidity inside the container.

When the temperature drops, moisture in the air condenses into water drops on the cooler surfaces of the container roof and walls.

This process of evaporation and condensation within the container is known as the container's condensation cycle, which follows the repeated changes in temperature between day and night.



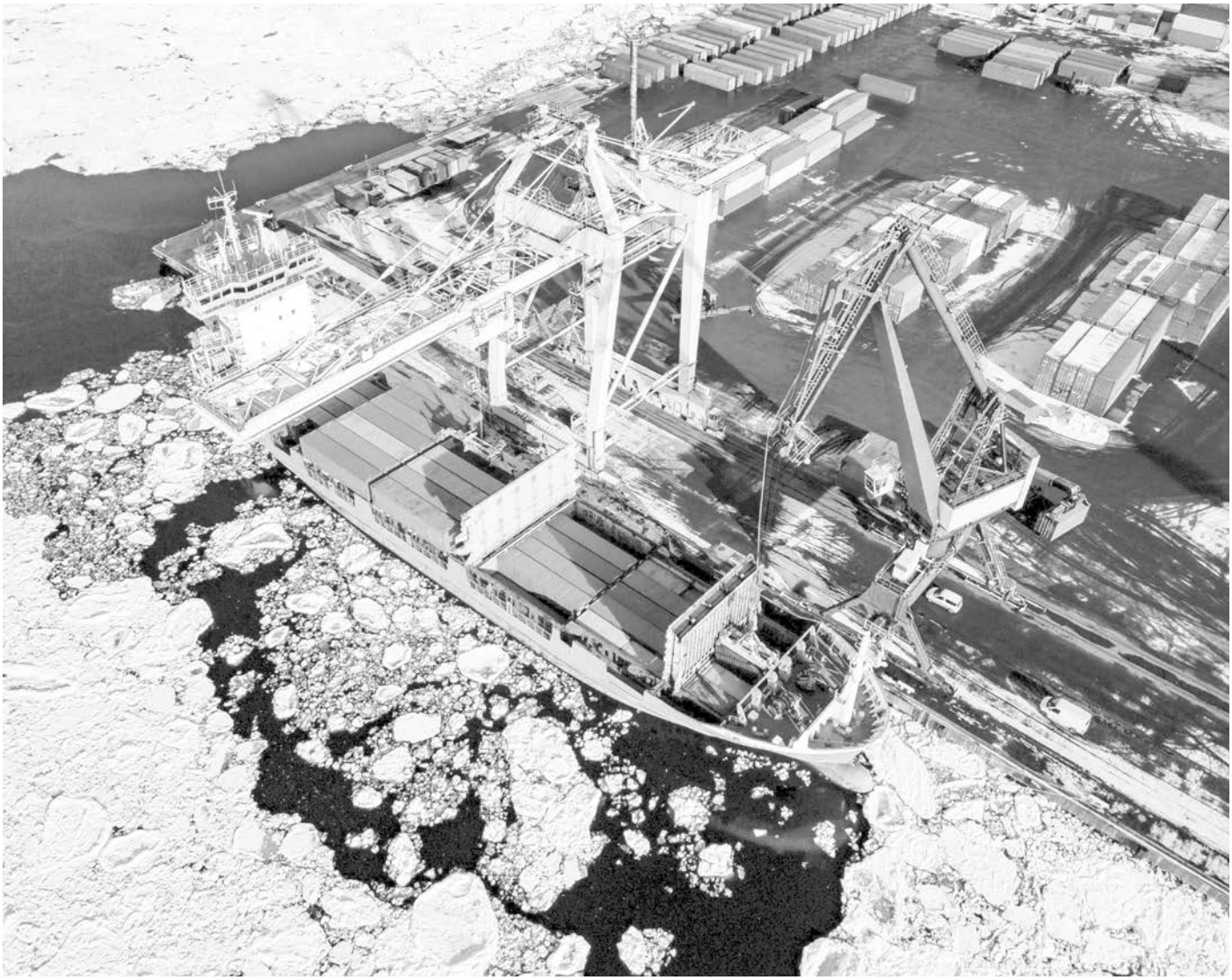


2

What is container rain and what problems may cause?

The result of this cycle is the so-called “rain effect”, which defines the fact that the drops of condensation that are formed on the roof of the container fall on the load below.

This causes moisture damage to the cargo, such as mold, fungus and/or oxidation in the case of transporting machinery or car parts.
Damaged packaging may mean that shipments are refused because the products are not fit for sale.



3 What is dew point?

The dew point is the temperature at which moisture in the air condenses. This is directly related to relative humidity, which is the proportion of water particles in the air and is expressed as a percentage.

This table shows what the dew point is according to the relative humidity and the ambient temperature that we have, as well as the grams of water vapor existing in each m3 of air.

The dew point is the point at which rain forms inside the container.

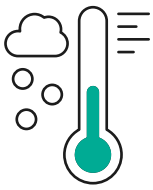
For example, if the temperature inside the container is 25ºC with a relative humidity of 70%, we can see in the table that in each cubic meter of air, there is 16.1g of water vapour, and that the dew point would be 19º. In other words, for water condensation to occur, the temperature should be kept below 19º.

These conditions are not uncommon inside a shipping container, and represent a very high risk to the cargo.

		10% RH	20% RH	30% RH	40% RH	50% RH	60% RH	70% RH	80% RH	90% RH	100% RH
+50ºC	vapour/m3(*)	8.3 gr	16.6 gr	24.9 gr	33.2 gr	41.5 gr	49.8 gr	58.1 gr	66.4 gr	74.7 gr	83.0 gr
	dp(*)	+8ºC	+19ºC	+26ºC	+32ºC	+36ºC	+40ºC	+43ºC	+45ºC	+48ºC	+50ºC
+45ºC	vapour/m3(*)	6.5 gr	13.1 gr	19.6 gr	26.2 gr	32.7 gr	39.3 gr	45.8 gr	52.4 gr	58.9 gr	65.4 gr
	dp(*)	+4ºC	+15ºC	+22ºC	+27ºC	+32ºC	+36ºC	+38ºC	+41ºC	+43ºC	+45ºC
+40ºC	vapour/m3(*)	5.1 gr	10.2 gr	15.3 gr	20.5 gr	25.6 gr	30.7 gr	35.8 gr	40.9 gr	46.0 gr	51.1 gr
	dp(*)	+1ºC	+11ºC	+18ºC	+23ºC	+27ºC	+30ºC	+33ºC	+36ºC	+38ºC	+40ºC
+35ºC	vapour/m3(*)	4.0 gr	7.9 gr	11.9 gr	15.8 gr	19.8 gr	23.8 gr	27.7 gr	31.7 gr	35.6 gr	39.6 gr
	dp(*)	-2ºC	+8ºC	+14ºC	+18ºC	+21ºC	+25ºC	+28ºC	+31ºC	+33ºC	+35ºC
+30ºC	vapour/m3(*)	3.0 gr	6.1 gr	9.1 gr	12.1 gr	15.2 gr	18.2 gr	21.3 gr	24.3 gr	27.3 gr	30.4 gr
	dp(*)	-6ºC	+3ºC	+10ºC	+14ºC	+18ºC	+21ºC	+24ºC	+26ºC	+28ºC	+30ºC
+25ºC	vapour/m3(*)	2.3 gr	4.6 gr	6.9 gr	9.2 gr	11.5 gr	13.8 gr	16.1 gr	18.4 gr	20.7 gr	23.0 gr
	dp(*)	-8ºC	0ºC	+5ºC	+10ºC	+13ºC	+16ºC	+19ºC	+21ºC	+23ºC	+25ºC
+20ºC	vapour/m3(*)	1.7 gr	3.5 gr	5.2 gr	6.9 gr	8.7 gr	10.4 gr	12.1 gr	13.8 gr	15.6 gr	17.3 gr
	dp(*)	-12ºC	-4ºC	+1ºC	+5ºC	+9ºC	+12ºC	+14ºC	+16ºC	+18ºC	+20ºC
+15ºC	vapour/m3(*)	1.3 gr	2.6 gr	3.9 gr	5.1 gr	6.4 gr	7.7 gr	9.0 gr	10.3 gr	11.5 gr	12.8 gr
	dp(*)	-16ºC	-7ºC	-3ºC	+1ºC	+4ºC	+7ºC	+9ºC	+11ºC	+13ºC	+15ºC
+10ºC	vapour/m3(*)	0.9 gr	1.9 gr	2.8 gr	3.8 gr	4.7 gr	5.6 gr	6.6 gr	7.5 gr	8.5 gr	9.4 gr
	dp(*)	-19ºC	-11ºC	-7ºC	-3ºC	0ºC	+1ºC	+4ºC	+6ºC	+8ºC	+10ºC
+5ºC	vapour/m3(*)	0.7 gr	1.4 gr	2.0 gr	2.7 gr	3.4 gr	4.1 gr	4.8 gr	5.4 gr	6.1 gr	6.8 gr
	dp(*)	-23ºC	-15ºC	-11ºC	-7ºC	-5ºC	-2ºC	0ºC	+2ºC	+3ºC	+5ºC
0ºC	vapour/m3(*)	0.5 gr	1.0 gr	1.5 gr	1.9 gr	2.4 gr	2.9 gr	3.4 gr	3.9 gr	4.4 gr	4.8 gr
	dp(*)	-26ºC	-19ºC	-14ºC	-11ºC	-8ºC	-6ºC	-4ºC	-3ºC	-2ºC	0ºC
-5ºC	vapour/m3(*)	0.3 gr	0.7 gr	1.0 gr	1.4 gr	1.7 gr	2.1 gr	2.4 gr	2.7 gr	3.1 gr	3.4 gr
	dp(*)	-29ºC	-22ºC	-18ºC	-15ºC	-13ºC	-11ºC	-8ºC	-7ºC	-6ºC	-5ºC
-10ºC	vapour/m3(*)	0.2 gr	0.5 gr	0.7 gr	0.9 gr	1.2 gr	1.4 gr	1.6 gr	1.9 gr	2.1 gr	2.3 gr
	dp(*)	-34ºC	-26ºC	-22ºC	-19ºC	-17ºC	-15ºC	-13ºC	-11ºC	-11ºC	-10ºC

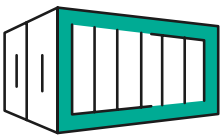
*grams of water vapour per cubic meter of air / dp = dew point

What factors increase the risk of producing the rain in the container?



TEMPERATURE

It's impossible to control the weather during transportation. The products are often exposed to extreme conditions.

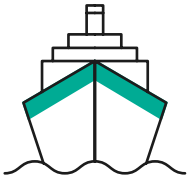


TYPE OF GOODS

The existing humidity in many packaging (wooden pallet, cardboard boxes...) contributes to the condensation cycle.

LOAD CONDITIONS

Loading the goods in a place where there is a higher volume of moisture in the air will result in a higher relative humidity inside the container.



POSITION OF THE CONTAINER ON THE SHIP

If the container is exposed to sunlight, it will experience a greater range of temperature fluctuations.

DELAYS IN LOADING AND UNLOADING

The most drastic temperature fluctuations occur at loading and unloading, since it is when the containers are directly in the field exposed to the sun. Any delay at this stage of the journey means extending the period of risk.

DESTINATION

If your shipment crosses the equator or moves from one climate zone to another (winter-summer), the risk of condensation damage increases. The duration of the trip affects the risk of your cargo.

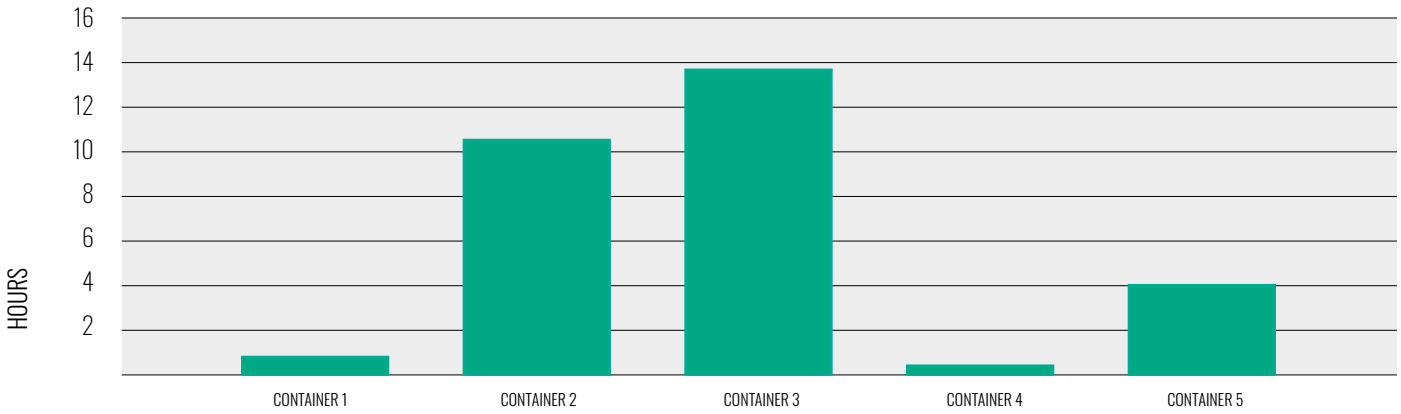
5 What risk factors exist?

The risk factors are so unpredictable that it is common to see containers that have been loaded twice on the same day and shipped on the same ship arriving with different levels of container rain damage.

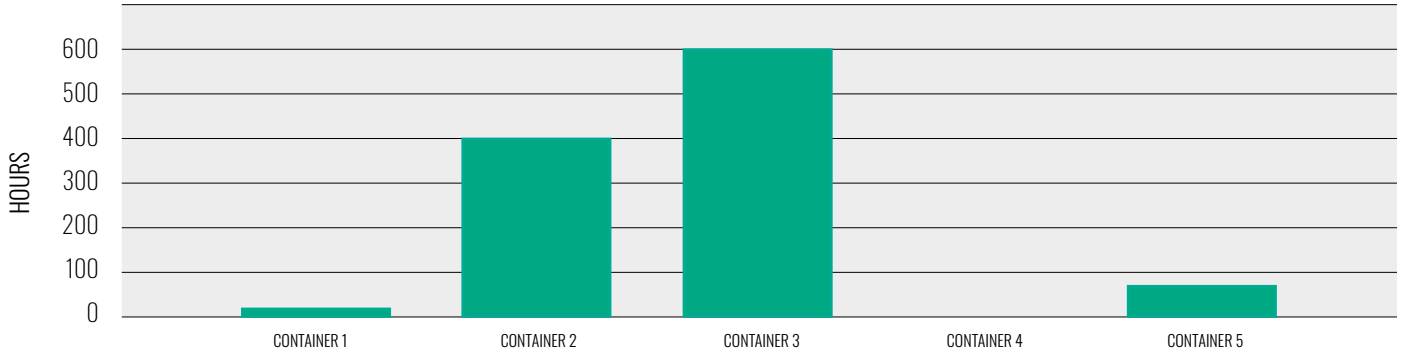
The graphic shows a study on condensation damage in container shipments. Two of the five containers had extended periods of uninterrupted container rain, while the others experienced no moisture damage.

As mentioned, there are different reasons that contribute to these variations, such as the position of the containers on the ship, the order in which they were unloaded, and subsequent delays.

Longest period of uninterrupted container rain



Total rain points of the container identified by periods of 30 minutes



6 How to prevent condensation in containers?

We recommend using a combination of solutions to break the condensation cycle inside the container at several key points and protect cargo from moisture damage.

PRODRY ABSORVENT BLANKET

ProDry Absorbent is an innovative system to absorb the humidity that is created in the roof of the container.
This ultra-absorbent blanket acts as a waterproof barrier between your goods and moisture as it can absorb up to 8 liters/m2.

PRODRY GEL CONTAINER

ProDry Gel Container is a concentrated desiccant that combines leak-proof and fast-absorbing ingredients in order to give you and your shipments peace of mind and can absorb up to 350%.

PRODRY CLAY CONTAINER

ProDry Clay Container is a desiccant composed of natural clay and calcium chloride with an absorption of up to 60%.

7 What type and how many desiccants should be used in the container?

One of the key factors when differentiating desiccants is the absorption capacity, which must be placed in a container and therefore this will affect the number of units.

Currently there are mainly 2 types, those of natural clay mixed with calcium chloride that can absorb up to 60% approx and those of the gel type, which are a mixture of high purity calcium chloride mixed with a gelling agent and can absorb up to 350%.

The amount to be used in each case depends on many factors, such as the destination, weather conditions during transport, location of the container inside the ship, transit days, type of packaging.

In this table we attach approximate recommended amounts

	ProDry Gel Container	ProDry Clay Container
Absorption capacity	350%	60%
Total absorption per 1kg	3,5 L	0,60 L
Recommended quantity 20”	4-6 Kg.	20-24 Kg.
Recommended quantity 40”	8-12 Kg.	40-48 Kg.

*It is recommended to use ProDry absorbent blankets to protect better your merchandise.

8 Why use ProDry absorbent blanket if I already use desiccants?

Desiccants don't act like a magic sponge. They do not absorb all the moisture from the air as soon as they are placed in the container. Desiccants work gradually, absorbing a little bit of moisture each day over the course of a trip.

This starts the risk of condensation damage as soon as the temperature drops on the first night. The desiccants have not had a chance to absorb a significant amount of moisture, and condensation will already begin to form on the roof and walls of the container. This cycle will be repeated night after night, which means that the load will be constantly exposed to rain inside the container.

Another key stage when goods are at risk of condensation damage is at the end of a journey when the desiccants have reached their maximum capacity.

This risk is increased by a greater change in temperature when the containers arrive at the port of destination and are exposed to direct sunlight for a few days. According to the latest studies, even if we put 100 kg of desiccants inside the container, in many cases they would not be able to absorb all the moisture produced during transport.

For this reason, it is highly recommended to combine the desiccants with the absorbent blanket to have comprehensive protection against condensation damage.

Under these circumstances, a shipper could pack their container with 100kg of high-quality desiccants, and there would still be a risk of rain in the containers. That's why desiccants are best combined with the absorbent blanket to provide a comprehensive level of protection against condensation damage.

9 Tips to follow before loading the container

1. Whenever possible, use a clean, dry, and odor-free container.
2. It is recommended to order the container one hour before loading, in order to control its good conditions.
3. It is recommended to control the humidity of the wooden floor of the container, which should not be higher than 15% -18%, as well as preventing the wooden pallets and other packaging from containing a lot of moisture.
4. The container door seals must be in good condition to prevent further entry of air and water into the container.
5. Carry out the light test by closing inside the container to check if there is light entering through any holes.
6. Hang the desiccant bags from the upper rings distributed evenly throughout the container.
7. Do not cover the container vents.
8. Calculate the amount of kg needed depending on the destination, type of container and type of cargo.
9. It is recommended to place a moisture-absorbing blanket (J2 dry absorbent blanket) on the roof of the container, to absorb any excess sweating that is created at certain times of the trip on the roof of the container, the so-called "rain effect".

Why use our products ProDry Gel?

They prevent damage related to humidity and condensation that usually occurs during container transport.

- We produce top quality products at very competitive prices
- National manufacturing and with 100% European products (Germany and Holland)
- Easy and fast installation and at a very economical cost
- Can be disposed of as common waste after use
- Special hook with anti-fall "click" system
- Does not drip even if it reaches its maximum absorption
- Absorption capacity of up to 350%
- Aenor certificate for being in direct contact with food
- Cheaper product than the traditional 2kg model
- Reduction of packaging and carbon footprint (You have to use 4 times less material)
- We comply with all international standards RoHS, REACH, FDA and suitable for organic farming
- Shelf life in storage 2 years
- Availability in various formats
- Delivery time 24-48 hours

Surely the best product on the market today!
Insuring cargo is not a luxury, it is a necessity!

YOU SHIP
WE PROTECT
CARGO PROTECTION SYSTEMS

C/ Narcís Monturiol, 25 - P.I. Salelles II
08253 St.Salvador de Guardiola

Tel. (+34) 93 835 59 59
comercial@j2servid.com

ISO 9001
ISO 14001
INTEGRATED MANAGEMENT
UKAS MANAGEMENT SYSTEMS
0015

j2servid.com

FSC PEFC