

pallets and packaging

Transportation

Vehicle trailers (curtain or box) must be checked before loading palletised goods to ensure they are clean, free of pooled water, wooden flooring is not damp and there are no leaks. Conditions inside closed trailers are affected by climate changes. Condensation, darkness and lack of ventilation, are all factors to be considered particularly involving extended time spent in the trailer and long haul journeys.

Steel shipping containers present different challenges when exposed to extreme internal and external climate changes during shipment across different hemispheres. Condensation on walls and ceilings inside the container will drip water (container rain) onto both the product and pallets. High levels of humidity and temperature inside the container bathed in darkness and no ventilation are favourable conditions for mould growth.

Maintaining the dry condition of the pallets before and during loading of the container is important. The use of desiccants will help to absorb moisture inside the container. Choosing a container lined with plywood will also help to minimise the risk from moisture.



User Responsibility

It is important to note that no wooden pallet can be guaranteed mould free when mould spores, a natural phenomenon, are forever present in the air. Wooden pallets supplied with dried timber to a required moisture content, will ensure the pallets are delivered free of visible signs of mould and potential related problems for the user.

The pallet user must acknowledge they also have a responsibility to prevent mould.

By following the requirements stated to keep the pallets dry, remains the best practice strategy to prevent mould growth.



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best practice guide to timber stain and mould
for users of wooden pallets

TIMCON has produced this guide for users of wood packaging (pallets) to give an insight into timber stain (blue stain) and mould.

What differentiates mould from stain and how to determine the difference? While timber stain is important to the user from the perspective of aesthetics of unit load appearance, mould carries the stigma of uncleanliness and risk to human health.

The main purpose of this guide is to focus on practical measures outlined herein to minimise the risk of mould occurring.

Timber Stain

Timber staining (blue stain or sap stain) typically bluish or greyish can also be black discolouration of wood caused by deeply penetrating fungi. The discolouration is permanent and may appear unsightly but its effects are cosmetic and pose no risk to human health.

Testing in Europe and North America has confirmed that blue stain has no detrimental effect on the strength of the wood. The European Standards Body CEN confirmed this in BS EN 2246 1999, Quality classification of timber used in pallets and packaging, where it permits the unrestricted use of blue stained timber.

"dry" term relates to average moisture content of a dried wooden pallet that forms a contractual agreement between supplier and customer

Mould

Microscopic mould spores are everywhere in the air constantly floating around settling on any surface (not just wood). Optimal conditions are - moisture, warmth, oxygen, food source and lack of ventilation. Mould spores will germinate in favourable conditions and grow producing more spores for reproduction.

Conditions that favour the development of mould are the same for blue stain – surface moisture in excess of 20%, moderate to warm temperature (15 - 32 C) and poor ventilation.

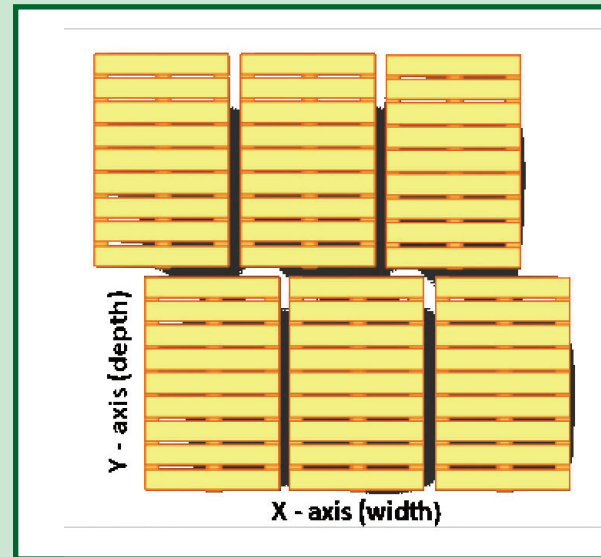
Kiln dried or air dried timber at $\leq 20\%$ moisture content produces unfavourable conditions for mould germination and blue stain fungi to develop. Pallets delivered dry are susceptible to mould and stain if they become rewetted by rain or exposure to other sources of moisture. It is important therefore to store wooden pallets in dry and well ventilated environments and to ensure as far as reasonably practical, minimal exposure to moisture up to final delivery of palletised goods.

Visually it can be difficult to tell mould from stain. Mould spores grow on the surface of the timber whereas stain is a discolouration of the timber. A simple rub test using a cloth or disposable wipe over the affected surface will generally give a positive result. Mould spores will rub off onto the wipe whereas stain will not. Wipes used for this purpose must be properly disposed of and not be allowed to come into contact with any other surface to prevent transfer of mould spores.

Unloading and Storage

Pallets must be unloaded from the vehicle trailer upon delivery and stored protected from rain in a well-lit and well-ventilated area with good drainage to eliminate standing water, away from other sources of moisture for example, vented from machinery or processing activities.

- Pallets should not be left in closed trailers longer than 24 hours before unloading.
- Pallets transported in curtain sided trailers that cannot be immediately unloaded, opening the curtains will improve ventilation in dry weather conditions.
- Storage under canopy (Dutch barn), pallets must be stored sufficiently inbound of the roof perimeter to afford protection from precipitation, spray and water splash from passing vehicles. Avoid this type of storage environment which is open to prevailing wind from open fields or farmland blowing moisture laden air onto stored pallets.
- Wherever it is practical to do so, avoid block stacking pallets in close (touch) formation, this restricts airflow between the stacks and inhibits the natural drying of moisture from the wood.
- Avoid pallet storage in dark or dimly lit areas and warm temperatures without ventilation.
- Pallets that have become surface wet or frozen in winter should be allowed to dry (thaw and dry) in a well-ventilated environment before being brought into heated environments.
- Stacks of pallets should be arranged in storage with a minimum perimeter gap of 100 mm for ventilation around each stack. Storage space permitting, air flow across stacks of pallets is improved when pallets are stacked in neat rows in the X axis, orientating the rows in the Y axis (offsetting alignment) improves airflow across the stacks.



- Stacks must be kept away from direct contact with building walls and steel cladding. This will prevent any damp, moisture condensation or mould spore transfer to the pallets. Dry controlled pallets should not be stored adjacent to or in the same area as uncontrolled pallets stocks to prevent any risk of cross contamination.
- Operate FIFO, 'first in first out stock rotation'. Pallets continually blocked in escape notice of any change in condition often until it is realized there is a mould problem.



Unit Load Packaging

There are disadvantages associated with the use of plastic wrap and shrink wrap as described further on. Users of this type of tertiary packaging must consider the potential effects and take appropriate action to ensure both goods and pallet are ventilated.

Plastic wrapping product to a pallet particularly when the product is warm will cause condensation to form on the inside surface of the wrapping. This condensation is trapped and will be absorbed back into the pallet. The warmth and trapped moisture are favourable conditions to cause mould.

Similar effect of condensation and moisture absorption will occur when product and pallet are encapsulated in plastic wrap and stored in direct and warm sunlight.

Plastic wrapping extending over the pallet perimeter and blocks encapsulates the pallet restricting air flow. The natural and continuous process of timber drying creates condensation between the timber blocks (also composite blocks) and plastic wrapping. Trapped moisture, no ventilation and relative warmth between pallet blocks and plastic provide favourable conditions for mould.

Goods stacked inbound of the pallet load deck perimeter with the wrapping extended over the perimeter of the deck, creating a tent effect. Consideration should be given to the use of a slip sheet or protective membrane between the packaged goods and surface of the load deck. This will prevent any trapped moisture being absorbed by the pallet.

Use of perforated plastic wrapping improves ventilation providing the wrap is evenly distributed over the load enabling the perforation to work as intended. Overwrapping the perforation as is often the case being counter-productive to intended purpose.

Palletised goods should be regularly checked in storage for any signs of mould occurring.

Outbreaks of mould contamination must be dealt with quickly to reduce airborne spore density. Small patches of mould can be removed by spot cleaning using a 2:1 ratio of water to household bleach.

The bleach kills existing mould and prevents further release of mould spores but it does not prevent mould from reoccurring. Vigilance and a good housekeeping regime will minimize the potential for mould growth.