UK P&I CLUB

Carefully to Carry

Carriage of forestry products

Softwood and hardwood timber, plywood and paper products

Softwood timber

The main areas from which softwood timber is shipped are the Baltic and North America. Very few claims arise from the Baltic or the east coast of North America trades, but large claims have occurred on shipments of timber from the north west coast of North America mainly due to the very wet climate in this area. Softwood timber is commonly shipped in bundles or packages of planks of various lengths and sizes, secured with flat metal strapping bands. The timber is usually unprotected unless it has been kiln dried, when it is normally protected by a loose plastic wrapper or shroud.

Softwoods, and especially pinewoods, carry a great deal of sap and are therefore very susceptible to fungal growth known as sap staining. This sap staining is of relevance only where strength or appearance is of prime importance. In this respect it should be borne in mind that clean timber is always a more attractive product. Blue staining occurs mainly in hardwoods and can be prevented by dipping the timber in chemicals. This must be done within one day of sawing the timber into planks or it may not be effective and may not prevent blue staining. This timber is often stored in the open, exposed to inclement weather, so that water may destroy the effect of the chemicals. Fungal development is purely associated with the moisture content of the timber and therefore kiln-dried timber that has been properly dried is normally not affected by fungal growth.

There is so much rain in the British Colombia area of the north west coast of North America that timber is often loaded during pouring rain and is wet before shipment in most instances. The problem is further exacerbated because the rain enters the ship's hatchways and the tank tops can become partially flooded. Apart from the bottom packages of timber becoming thoroughly soaked, the water may stain the timber with rust marks picked up from the ship's structure. It is therefore recommended that provision be made to keep the bilges pumped dry at all times when loading during rain. A further problem occurs in that the metal strapping bands securing the bundles of timber become rusty and the rust runs into the timber with resulting stain.

It is important to emphasize that many thousands of tonnes of softwood timber have been shipped over the years in a thoroughly wet condition on long voyages, with no ventilation between the planks or packages in the stow and with the timber remaining saturated for the entire voyage, without developing any defects as a result. Invariably, bills of lading are signed 'clean', as it is a well known fact that timber shipped from the British Colombia area can be, in most instances, shipped in a wet condition. However, claims can arise as a result of blue staining, rust staining, or in some rare instances, rotting. Claims may also arise after discharge for drying the timber. It is therefore recommended that bills of lading should be claused with appropriate remarks to reflect the condition of the timber as shipped such as 'timber rust stained', and 'wet before shipment'.

"The carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried."

Hague Rules, Articles iii, Rule 2

Carefully to Carry Advisory Committee

This report was produced by the Carefully to Carry Committee – the UK P&I Club's advisory committee on cargo matters. The aim of the Carefully to Carry Committee is to reduce claims through contemporaneous advice to the Club's Members through the most efficient means available.

The committee was established in 1961 and has produced many articles on cargoes that cause claims and other cargo related issues such as hold washing, cargo securing, and ventilation.

The quality of advice given has established Carefully to Carry as a key source of guidance for shipowners and ships' officers. In addition, the articles have frequently been the source of expertise in negotiations over the settlement of claims and have also been relied on in court hearings.

In 2002 all articles were revised and published in book form as well as on disk. All articles are also available to Members on the Club website. Visit the Carefully to Carry section in the Loss Prevention area of the Club website www.ukpandi.com for more information, or contact the Loss Prevention Department.

Hardwood timber

Although hardwood and semi-hardwoods are shipped from many tropical and semi-tropical countries in the world, much of this timber, especially from West Africa, is shipped as logs. Shipments of logs do not usually generate any cargo claims and therefore are not dealt with in this article.

Hardwoods and semi-hardwoods shipped from South East Asia, especially to Europe, are commonly shipped as boards in bundles or packages secured by metal bands. Most are unprotected. The following are some common types of timber from this part of the world.

MERANTI
A relatively light semi-hardwood suitable for general construction, interior fittings and furniture. The subgroups include, meranti bakau, dark red meranti, light red meranti, white meranti and yellow meranti. This timber is not durable under tropical conditions and is difficult to treat with preservatives. However, it is easy to work and seasons without trouble. It is shipped into Europe in large quantities and used extensively for doors, window frames and other outside uses.

MERBAU
A heavy, hard, fairly strong and durable wood used mainly for heavy construction. It is bronze or red/brown in colour, weathering to dark red brown.

RAMIN
A moderately hard, moderately heavy utility wood, easily treated with preservatives. It seasons quickly but is very liable to blue stain and it is therefore advisable to dip the timber in anti-stain chemicals after sawing. The timber is white in colour and usually free from quality defects. It is used extensively in the furniture trade and is highly susceptible to claims.

There are of course many other species of timber but most shipments into Europe from South East Asia include some of the types above.

Loading and care of timber cargo

It is of paramount importance that cargo holds are thoroughly cleaned before timber cargo is loaded, of whatever type. Any grease and oil should be removed from the vessel's structure, as contact can stain the timber. All remnants of previous cargoes should be removed from the overhead beams and the underside beams of the hatch panels, as claims have arisen as a result of remnants of previous cargoes contaminating the timber. For example, iron ore dust when made wet by condensation can turn into a red liquid which can stain the timber; and ores or sand of an abrasive nature, such as ilmenite ore, can damage the saws in sawmills, if the timber has been contaminated.

If the steelwork of the hold is rusty, the timber should be kept clear of the rust by use of dunnage. Ship's sweat developing during the voyage and dripping on the timber may also result in rust stains, therefore, correct ventilation and dunnaging is of great importance.

Bad stowage often results in the bands securing the bundles breaking. This is usually as a result of not keeping the stow level or crossing the bundles in stow, or a combination of the two. It is the practice for stevedores to work fork-lift trucks on top of the timber in the square of the hatches in bulk carriers, when the stow has reached about half the height of the hold. The surface of the timber in contact with the trucks usually becomes damaged by scuffing and through oil dripping from the trucks. If this method of loading is to be used, then steel plates should be carefully laid over the exposed timber to protect it.

Care should always be taken during loading and discharge to use correct equipment. Wire slings tend to score the lower corner planks in the bundles, especially when the slings are overloaded therefore, rope or webbing slings are preferable. Fork-lift truck damage, caused by the forks of the truck being driven into the planks, is common. This results in deep score marks in the timber and, in many instances, splitting of the timber.

Careful supervision by the ship's officers can prevent much of this type of damage.

Seasoning of timber

Reduction of the moisture content of timber is achieved by either air drying or by kiln drying. Timber is fully seasoned when the moisture content has been reduced to the equilibrium moisture content of the local climate. This, in most cases, would be between 15 and 18%.

Air-dried timber

As the name implies, air-dried timber is timber that has been allowed to dry naturally, usually by stick piling the sawn planks in covered storage allowing natural air circulation between the planks. The time required for this process will depend on the type of timber and the climate. Once seasoned, the planks are secured in bundles with a number of flat metal strapping bands and are ready for shipment.

Often these bundles are stored in the open and exposed to the elements, resulting in moisture infiltrating the individual planks. Although this may result in the planks on the outside of the bundles having a higher moisture level than expected, these planks will quickly dry naturally. The condition of the internal parts of the bundles will depend on how long free moisture has been trapped within the bundles and also the nature of the timber, i.e. its resilience to the effects of wetness. In the worst situation, the planks will be mouldy, still wet and severely black stained.

In general, high moisture contents for air-dried timber, without staining, do not provoke claims. However, if the moisture content is excessive, it is not unknown for receivers to claim the costs of stick piling to re-dry the timber. If such timber is not dried and remains in store, mould may develop and could lead to staining of the timber.

Air-dried timber is often carried on deck with shippers' approval, without protection. It is therefore obvious that wetness and high moisture content are of no real concern in shipments of this nature. In most cases, air-dried timber has not been properly seasoned and has moisture contents well above the optimum levels which might be expected from the country of origin.

Kiln-dried timber

Because seasoning takes a long time when timber is allowed to dry naturally, and because the process is therefore expensive in terms of storage costs, the technique of drying timber in ovens has been developed.

The timber, after treatment, is generally referred to as kiln-dried timber. Sometimes, bundles of kiln-dried timber are protected by plastic wrappers, and have a stencil on the outside of the bundle denoting the fact that the timber is kiln-dried.

Kiln-drying certificates usually specify to what degree the timber has been dried. The usual parameters are 8-12%, 14-16% or 16-18%. Provided the timber has spent sufficient time in the kiln and has been properly treated, the moisture content at the heart of each plank should show the correct degree of drying within one or two percent, even though the surface of the plank may show a higher level of moisture through natural absorption after the kiln-drying process. Sometimes, the moisture content reading to the heart of the plank shows a higher reading than the outside of the plank and much higher than the drying certificate timber. This is a clear indication that the timber has not been properly dried. These points should be taken into consideration if receivers claim for re-drying costs on wet timber. When granting allowances for redrying, it should be recognized that stick piling for air drying may be all that is necessary if the outer surfaces of the planks only are affected. Stick piling is normally considerably cheaper than oven drying.

Claims for re-drying of kiln-dried timber represent a large proportion of claims on timber cargoes. It is often alleged by cargo interests that to stow kiln-dried timber in the same cargo hold as air-dried timber is tantamount to not caring properly for the cargo. Provided the air-dried timber has not been exposed to rain before shipment and become saturated any allegations of this nature should be rejected. Whether timber is air-dried or kiln-dried it will eventually adjust to the optimum moisture level compatible with its equilibrium relative humidity, developed in due course, through contact with the ambient air. Therefore, loading of airdried and kiln-dried timber in the same ambient air will not affect the kiln-dried timber to any noticeable degree during the voyage. Naturally, if dry timber is stowed in the same hold as saturated timber the moisture content of the outer planks of the dry timber will increase through absorption. Experience has proved that in these circumstances, the inner planks within the bundles are not affected during the course of a normal sea voyage. It is also true that wet timber, or timber with too high a moisture content, will not dry, irrespective of how well the bundles are ventilated in stow. On a normal sea voyage, the timber will not deteriorate. However, if the timber is not dried when discharged, it will eventually decay.

If timber is kiln-dried too quickly or the moisture level reduced too far, this can result in the timber cracking. Usually, any damage of this nature will not be seen at the time of shipment. Claims for this type of damage should be rejected.

Plywood

Plywood is a commodity which is transported in large quantities in sea-borne trades throughout the world. It is also a commodity which is highly susceptible to damage and is often insufficiently packed for shipment.

The manufacture of plywood has been described as 'the unrolling of logs of wood'. Very long thin sheets are shaved from the log which, after being cut to size, are glued together to form plywood of various thicknesses. These thicknesses vary from around 4mm to 25mm and the sheets vary in size, the most popular being 96" by 48" (244cm x 122cm). Moisture content of this manufactured product has been found to be about 9%.

The method of transporting plywood is to stack the sheets into bundles of about fifty sheets or more depending on the thickness of the plywood, which are secured together with metal strapping bands across the width of the base of each bundle. It is not unusual for plywood to be transported in a completely unprotected condition. In some trades the plywood is partly packed and, on rare occasions it is completely packed and protected.

Very often when packing is used, it is deficient, failing adequately to protect those areas which are vulnerable to handling damages, such as on the corners of the bundles. One of the most common forms of packing is an arrangement where the stack of plywood is placed upon a wooden frame after the plywood has been enfolded in a plastic sheet. The sides, ends and top are then covered with plywood sheets and strapped up with flat metal strapping bands. If done properly and with care, this packing can adequately protect the plywood from normal handling and stowage problems.

Plywood budle showing torn plastic sheeting with loose and broken strapping bands'

Often, this packing is applied without sufficient care. Any deficiency or tear in the plastic sheeting can allow moisture penetration into the bundle of plywood. The strapping bands are sometimes of inadequate strength and the method of joining them is often unsatisfactory. This results in a lack of rigidity of the bundle causing the plywood sheets to become misaligned during handling. In the worst cases, the bundle becomes loose with the damage to the edges of the plywood being considerable. If the plywood side, end and top packing is too short, corner damage can occur. It can be seen from the above that it is of the utmost importance that bundles of

plywood should be examined by the ship's staff before loading, paying particular attention to the packing of the plywood, if any. Deficiencies in packing should be noted and suitable remarks inserted on the mate's receipts and bills of lading. Careful attention should be paid to stowage, to prevent corner damage both during the stowage and in the securing of the stow. The stow should be properly secured to prevent movement of the bundles of plywood during the voyage. Proper ventilation should be carried out during the voyage to minimize any possible staining from condensation. If possible, stowage should be away from the hatch square to prevent the possibility of moisture dripping down on the plywood externally, if the plywood is totally unprotected.

Paper pulp (wood pulp)

Paper pulp comprises principally of cellulose fibres which are normally produced from timber, although certain other raw materials which have a high cellulose content such as sugar cane residues may be used. The highest quality papers are still manufactured from textile (rags), but trade in these is insignificant.

There are two basic procedures used for separating cellulose fibres from timber. The first is a purely mechanical process whereby logs are stripped of bark, knotted and ground, using water as a coolant and transport medium for the fibres produced. The slurry of fibres is passed through screens and strainers to remove over-sized material which is returned to the grinders. It then passes over a cylinder board machine to convert it into sheet form. The sheets then pass through hydraulic presses to remove excess water. The sheets of pulp may be baled at that stage, but, for overseas trade, are normally further dried to a moisture content of about 10%, before baling in hydraulic presses and banding.

There are various grades of mechanical wood pulp which are used for the manufacture of different types of paper or board.

The second process for the production of paper pulp from wood involves stripping and knotting as described earlier. After this, the timber is cut into wood chips. The wood chips are the raw materials for chemical treatment process.

Discharging unitised wood pulp

The most important of these is an alkaline digestion process known as the sulphate processes which produces sulphate or 'kraft' paper pulp. The other major process involves digestion with sodium bi-sulphite to produce 'sulphite' pulp.

There are various refinements to both the sulphate and sulphite processes which are designed to produce pulps with different properties, such as mechanical strength and softness. Any type of pulp may be bleached to varying degrees to produce white pulps for paper or board manufacture. Ocean shipments of paper pulp usually involve the carriage of bleached material.

The bales are banded under compression using special equipment and if bands are broken it is not possible to restore the bales. This is of particular significance because modern paper/board-making processes rely on bales being in sound condition up to the time the pulp sheets are fed into a re-pulping machine. The pulping machines (hydropulpers) are essentially tall cylinders with conical bottoms in which there are horizontally rotating blades. The bales are conveyed to the tops of the cylinders. At this point the

Unitised wood pulp. Note the use of airbags to secure the stow

bands are cut and removed and then the whole bales are dumped into the hydro-pulpers (which are partially filled with water). For this reason the same paper pulp which forms the sheets within the bales is used to form the protective outer wrapping. Shippers/receivers often claim that the outer 'protective' wrappers form a part of the contents. By such arguments we believe that the bales are unprotected and are thus insufficiently packed. See 'Soiling' on the next page.

Wetting

If bales become seriously wetted the cellulose will absorb water like blotting paper and swell, breaking the bands, with consequent problems, as discussed above. Prolonged wetting, such as would occur if bales were partly immersed in water, can also affect the strength of cellulose fibres. High quality pulps which have been wetted are sometimes considered unsuitable for their original use and the pulp is sold for manufacturing a different product at a reduced price. Comparatively minor wetting can result in rusting of certain types of bands. Obviously any resulting rust staining produces localized spots of discolouration on finished white papers. Any obvious spots are unacceptable. This type of wetting can result from inappropriate ventilation of cold cargoes. It must be remembered that much of the wood pulp traded around the world is shipped from countries which experience very cold winters. Masters must therefore ventilate cargoes and record their adopted ventilation regime according to established good practice as described in various articles in Carefully to Carry.

In theory, localized wetting of paper pulp can result in mould growth on the surface. However, there is normally sufficient moisture transfer through a bale to prevent this occurring particularly as cellulose does not provide adequate nutrition for most mould species.

There have been occasions when the swelling of seriously wetted bales has resulted in structural damage to the ship. This is a remote possibility but the consequences can be catastrophic.

Soiling

Although paper machines are fitted with strainers, magnetic screens and similar devices, soiling of the outside of bales can result in particles of foreign material being incorporated in finished paper or board. Soiled bales, particularly where the soiling consists of particulate material such as grain or plastics granules, can be unacceptable to receivers. They can overcome the problem by tearing off the outer wrappers, but this not only results in loss of material but also is labour intensive. In an industry which is largely mechanised, providing suitable labour can be difficult and is costly.

Regenerated cellulose which is used to produce viscose rayon textiles and cellophane film is produced from very high quality bleached cellulose pulp. Because this process involves ejecting a solution of the cellulose through fine dies, any particulate matter in the solution can completely ruin the product. Pulp sold for this end use must be kept in scrupulously clean condition.

Taint

Cellulose will absorb odour and become tainted. Although many taints can be removed in the paper-making operation. Because massive amounts of water are used in paper making the water is recycled. Paper makers are particularly wary of introducing tainting materials into the water because in some instances the taint may be absorbed by the finished product. Such tainting would not be acceptable in products to be used in the food or other sensitive industries.

Fire

Paper pulp will burn. During handling, abrasion between bales can produce significant quantities of cellulose fluff that is particularly inflammable. It is evident that when a fire in a paper product gains hold, a massive amount of heat is produced. The heat is sufficient to cause structural damage to a ship. Extinguishing a fire at this stage is a major operation almost certainly requiring flooding of a hold.

Masters are advised that it is imperative that no smoking is allowed in or near a cargo of paper pulp and stringent precautions must be taken to avoid sparks from any source entering cargo holds. Bales of paper must not be contaminated with oil, particularly vegetable oil. Cellulose has a large surface area such that atmospheric oxidation of the contaminating oil can result in self-heating to the point of combustion.

Mechanical damage

Although this is less of a problem with paper pulp than with paper reels, bad handling may result in the breaking of bands or puncturing and contamination, which can cause difficulties as previously described.

Reels of paper and board

Paper and board are manufactured from paper pulp. This material is first re-pulped in water as described earlier and, after passing through various intermediate operations, such as straining to remove particulate matter, the aqueous slurry of fibre (about 0.5% cellulose fibres) is deposited as a continuous film on a recirculating wire mesh of a moving felt band. The belt passes over suction boxes that remove water from the film to produce a continuous paper strip containing about 35% cellulose. This is sufficiently strong to be stripped off the belt and threaded through a battery of heated rollers where it is further dried so that the paper or board emerging from the end of the machine has a moisture content of about 5%. The warm paper is reeled and possibly slit simultaneously into predetermined sized reels, by means of continuous reeling equipment.

There are a large number of different types of paper which can be produced by using different types of paper pulp and by various treatments during the paper making operation, such as sizing, opacifying, treatment to produce wet strength, polishing (calendering), coating etc. It is evident that more complex papers are commercially more valuable than less complex papers. It is also evident that sophisticated paper products which are unacceptable for the intended purpose must either be sold for scrap or returned for repulping. The pulp produced will inevitably be used for low grade products.

Major uses of paper are for newsprint and the manufacture of corrugated fibre board. Newsprint reels are used on high speed printing presses. Any interruption in the printing process, due to fault in the paper, results in a substantial financial loss. Users take particular care to ensure that only sound reels or reels which can easily be handled to make them sound, are accepted.

Although the users of kraft paper are not constrained by time in the same way as newspaper publishers, they also

employ high speed machinery of high capital cost and take the utmost care to prevent any interruption on a production line.

The two main forms of damage which cause problems with reels of newsprint and kraft are mechanical damage and wetting.

Mechanical damage

This may take the form of tears, cuts or snags. Where such damage occurs, the reels have to be unwound until completely sound paper is reached. It is possible to calculate the loss from the formula

$$\text{Weight of lost material} = \frac{R2 - (R-d)2 \times W}{R2 - r2}$$

where R = radius of reel
r = radius of core
d = depth of cut or other form of damage
W = weight of reel

The second form of mechanical damage is distortion which may result from unsatisfactory use of clamp trucks or any form of impact. Where distortion occurs, the paper web is subject to non-uniform tension during unreeling on a press or other machine. Because the web is under considerable tension, any nonuniformity can result in rupture.

Wetting

Newsprint reels are normally over wrapped with a wrapping system incorporating a waterproof barrier. Kraft reels are not so protected. However, significant wetting even of newsprint can result in the reels themselves being damaged.

Wetted reels, even after drying, normally present the same problems as distorted reels and again must be stripped down to undamaged paper before they can be used. Due to swelling of the fibres, severely wetted reels invariably split.

There are various precautions which should be taken by a ship's command to ensure the abovementioned problems are minimized if not eliminated.

Reels of newsprint showing tears and cuts both in the wrappers and paper before shipment

All reels should be examined at the time of loading for evidence of damage. As paper frequently originates from countries which are very cold in winter, they may sometimes be coated in a thin layer of ice, which is not detectable without careful checking. When found during loading, damaged reels should be rejected. If this proves impractical, mates' receipts should be claused giving details of affected reels, including the nature of the damage. Obviously bills of lading should be claused in the same terms as the relevant mates' receipts.

Reel of newsprint that has been standing in water before shipment

Ship's holds should be clean and dry before loading commences and preferably, the tank tops should be covered with kraft paper or boards.

Great care should be taken in order to ensure reels, which are always stowed vertically, are not subject to uneven pressure from such fittings as horizontal cargo battens or dunnage. Any objects which can snag reels such as projecting nails should be removed. Other projections should be cased in dunnage. Rough sawn dunnage should not be used in contact with reels. The most suitable contact material is plywood sheets. Reels should never be secured in a way which results in direct contact with wires or chains.

Bearing in mind reels of differing widths are often to be loaded in one hold, special care must be taken with stowage to ensure a stable stow. Care should be taken to prevent wetting onboard. Hatchcovers must be closed when rain is threatened.

The ship should, of course, be watertight and if the ventilation system is used, ventilators should be closed when-ever bad weather threatens. Paper reels originate from the same areas as wood pulp – i.e. often from ports where the temperature is very low in winter. Masters should either check temperatures of the reels, which is difficult to do as there may be significant variation through a reel, or assume the reels are at the same temperature as the ambient atmosphere and adopt a proper ventilation regime accordingly.

After loading in ports where the temperatures are of a low order and proceeding through/to areas of higher ambient temperatures you should not ventilate.

Conversely, there have been claims due to wetting of relatively warm reels by ship's sweat when atmospheric temperatures are falling, or when ventilation is interrupted during a period when the outside air temperature is lower than the dew point of the air in the cargo compartment, i.e. the ambient air surrounding the reels which is influenced to a degree by the peculiarities or characteristics of the actual cargo.

Another problem which has given rise to massive claims is taint. This is discussed in relation to paper pulp. It is not always easy to detect taint to paper reels, particularly when this originates from residual odours from previous chemical cargoes.

A case is known where bleached board was used for the manufacture of milk cartons and no taint was detected until complaints were received from the public who consumed the milk. The taint was traced to an earlier cargo of herbicides. Masters should obviously check, or arrange for surveyors to check, that holds to be used for paper products are not only scrupulously clean but also odour free. Because detection of odour is very difficult when the atmospheric temperature is low, when loading takes place under such conditions, it is recommended that known properties of earlier cargoes are reviewed.

Wetting and mechanical damage can occur at the time of discharge. Masters should obviously supervise discharging operations. Where damage is seen to arise as a result of mishandling by stevedores, the occurrence and nature of such damage should be reported in writing to the stevedoring company and recorded in the ship's log book.

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