ICHCA International Limited

INTERNATIONAL SAFETY PANEL BRIEFING PAMPHLET #23

SAFE HANDLING OF FOREST PRODUCTS

By
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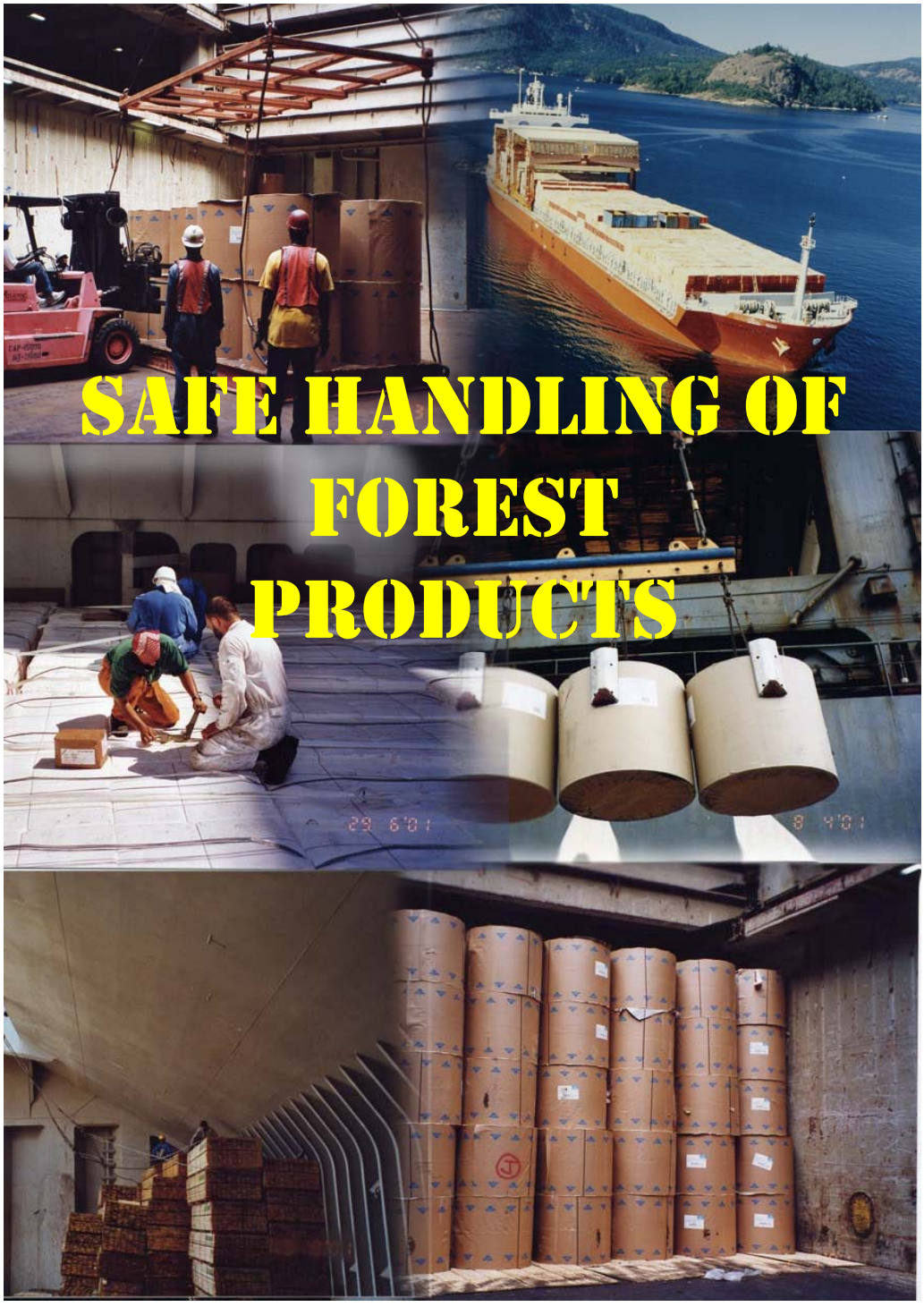
With

Paul Auston


SAFE HANDLING OF
FOREST
PRODUCTS

ICHCA INTERNATIONAL LIMITED is an independent, non-political international membership organisation, whose membership comprises corporations, individuals, academic institutions and other organisations involved in, or concerned with, the international transport and cargo handling industry.

With an influential membership in numerous countries, ICHCA International's objective is the improvement of efficiency in cargo handling by all modes of transport, at all stages of the transport chain and in all regions of the world. This object is achieved inter-alia by the dissemination of information on cargo handling to its membership and their international industry.

ICHCA International enjoys consultative status with a number of inter-governmental organisations. It also maintains a close liaison and association with many non-governmental organisations.

ICHCA International has an Honorary President, a nine person Board and National Sections and a Regional Chapter in various countries, together with an International Registered Office in the U.K. The office's primary role is to co-ordinate the activities of the organisation. It has an International Safety Panel and an International Research Panel. The Registered Office maintains a unique and comprehensive database of cargo handling information, publishes bi-monthly electronic newsletters, an annual hard copy report and operates a dedicated technical enquiry service, which is available to members. It also organises a biennial Conference.

Studies are undertaken and reports are periodically issued on a wide range of subjects of interest and concern to members and their industry.

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The International Safety Panel Briefing Pamphlet series consists of the following subjects:

No. 1	International Labour Office (ILO) Convention No. 152 Occupational Safety and Health in Dockwork (*revised)*
No. 2	Ships Lifting Plant (*revised)*
No. 3	The International Maritime Dangerous Goods (IMDG) Code (*revised)*)
No. 4	Classification Societies (*Revised*)
No. 5	Container Terminal Safety
No. 6	Guidance on the Preparation of Emergency Plans (*under revision)*
No. 7	Safe Cleaning of Freight Containers *(under revision)*
No. 8	Safe Working on Container Ships
No. 9	Safe Use of Flexible Intermediate Bulk Containers (FIBCs) *(Revised*)
No. 10	Safe Working at Ro-Ro Terminals
No. 11	The International Convention for Safe Containers (CSC)
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IIL/2 Dangerous Goods by Sea: The IMDG Code Labels, Placards, Marks and Signs
IIL/3 Confined Spaces on Board Dry Cargo Ships

Other titles in many of the series are in preparation

This publication is one of a series developed by the International Safety Panel ("Safety Panel") of ICHCA International Limited ("ICHCA"). The series is designed to inform those involved in the cargo-handling field of various practical health and safety issues. ICHCA aims to encourage port safety, the reduction of accidents in port work and the protection of port workers' health.

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ICHCA International Limited - INTERNATIONAL SAFETY PANEL

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About the Authors

Captain Peter D. Hull

Peter was born in 1942 and served an apprenticeship with P&O-Orient Lines. He was later employed in various seagoing ranks to Master in Gearbulk vessels. He is a Class 1 Master Mariner. Subsequently he has worked ashore for Gearbulk Ltd as Operations Manager both in U.K. and overseas, and also for Wallenius Wilhelmsen Lines. Since 2000 he has been working as a freelance Marine Consultant specialising in Ocean Transport and Logistic Solutions (with special reference to Operations and Productivity in the carriage of Forest Products).

Paul Auston

Paul's early career was at sea and when he came ashore he took a position with a rope manufacturing company based in Northern Ireland. This led to a lifelong fascination with the use of synthetic fibres and their development into lifting materials. He set up the company Checkmate of which he is now Chairman

Checkmate Avon

Checkmate Avon consists of two specialist manufacturing divisions in the United Kingdom. Textile lifting products are produced at Sheerness in Kent and Avon Fabrications based at Melksham in Wiltshire specialise in the design, development and production of specialist rubber fabrications, predominantly for the marine industry and are used on high speed craft throughout the world. The company holds ISO 9002 certification, in addition to Type Approvals, on its products from a number of Classification Societies.

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1 INTRODUCTION

1.1 General

1.1.1 The process of transporting forest products around the world involves terminal handling, stevedoring, and carriage by sea. These functions, and the way they interact are described in this safety briefing pamphlet.

1.1.2 The purpose of this booklet is to set down some general principles of safety and handling of forest products, both onboard and ashore, which may be described as good practice. It should be read in conjunction with the IMO Code of Safe Practice for cargo stowage and securing, the IMO Code of Safe Practice for ships carrying timber deck cargoes, codes and guidelines for Ro-Ro vessels, and the approved cargo securing manual for each individual vessel.

1.1.3 It is not easy to compile a definitive set of rules for the safe handling of forest products because of different legislation and/or different methods of handling apply in various parts of the world. A modern set of international regulations on health and safety in the port industry, ILO Convention 152, was introduced in 1979 (*see also ICHCA International's safety briefing pamphlet # 1*).. At the time of publication, only twenty five countries have ratified this Convention. However, in many countries national legislation meets some or all of the criteria. Accordingly, national legal standards concerning safety do exist but may vary in different parts of the world.

1.1.4 Experience shows that accidents can be reduced, and the quality of cargo handling improved, if an organisation that has a positive safety culture. This requires commitment, training and investment on the part of management. Today, safety and quality are essential ingredients in a successful enterprise.

1.1.5 Lack of quality and/or safety can stem from many causes, such as:

- Direct causes (such as equipment failure)
- Underlying causes (such as poor motivation)
- Compounding causes (such as operator distraction or complacency)
- Negligence
- Routine violations of safety procedures or breaches of safe working practice
- Lapses of concentration
- Lack of job training
- Lack of safety training
- Lack of organisational control and supervision

1.1.6 When well-trained people do a job correctly and when potential hazards are controlled by safe systems of work it is likely to be a safe operation.

2 TERMINAL STACKING, HANDLING AND SAFETY

2.1 General

2.1.1 The importance of high quality terminal handling cannot be underestimated. The industry's increasing sophistication and heightened product values place a premium on cargo care and reliability. Terminals play a key role in the integrated movement of forest products.

2.1.2 The forest products trade worldwide has grown from 125/130 million tonnes per year in the mid 1980s to around some 170/175 million tonnes in 2000 (Drewry). This growth has been driven by increased construction activity and demand for more paper products. To some extent the materials being shipped today have moved 'up market' away from logs and pulpwood and towards more finished goods such as panel products, paper and boards. Nowadays forest products companies insist on the highest standards of service and handling - with 'zero damage'. These demands have caused forest products terminals to become more innovative and quality conscious.

Note: some of the following points are covered in ICHCA International's Safety Briefing Pamphlet #10 – Safe Working at Ro-Ro Terminals

2.2 Personnel

2.2.1 Only authorised people and vehicles should be allowed to enter working areas.

2.2.2 Everybody engaged in terminal activity should be properly trained in the functions they are required to undertake.

2.2.3 All such people should also wear high visibility jackets, hard hats, overalls and safety shoes.

2.3 Lift truck handling – General Operations

2.3.1 Lift trucks are used for handing a wide variety of forest products. They may be fitted with forks for package or pallet lifting, reel clamps for paper handling or bale clamps for handling wood pulp.

2.3.2 Lift truck operators should be aware of the following important points:

- All drivers should be fully trained to an approved standard
- All members of the workforce should remember that lift trucks have rear wheel steering which gives rise to wide swings of the truck's rear when turning
- Lift truck operators should take special care to look out for pedestrians when entering or leaving a warehouse

- Terminals should minimise and/or segregate pedestrian access to working areas

- When loading or discharging vehicles on the dock, look out for passing traffic, especially when reversing

- Drivers should pay attention to the correct setting of the lifting blades. They should be the correct distance apart and suitable for the job in hand. If fitted with roll clamps, the correct pressure settings should be employed

- Passengers should not ride on lift trucks

- Always drive at a safe speed

- Bring the machine to a stop before reversing.

- Come to a stop gradually except in the case of emergency. Jerky stops may spill the load

- Be aware of blind spots or reduced visibility caused by the load or the machine's mast. If necessary reverse as much as possible

- Always travel with the load about ten to fifteen centimetres off the ground with a slight tilt backwards. This keeps the centre of gravity as low as possible and prevents the possibility of overturning or losing the load

- Remember to adjust the height of the load when approaching ramps

- Do not turn or drive at an angle across inclines, including ramps

- When traversing ramps ensure that the load is facing 'uphill' at all times, select the correct gear, and do not use inching pedal on inclines

- Lower heavy loads slowly

- Do not tilt a raised load forward, except when directly unloading

- Be alert at all times and be aware of the height of doorways in relation to the height of the machine's mast or load

- Do not turn sharply at speed when loaded

- Check oil and water levels, and tyre pressures daily

- When parking, ensure that the brake is fully applied, the carriage lowered carefully, and the engine switched off

- Ensure parking on level ground or deck

- Never operate a truck with a soft tyre

- Do not exceed the safe lifting capacity of the machine or forget that heavy loads affect steering and increase leverage on the machine

2.3.3 Work and traffic should be organised in a way that avoids collisions or misunderstandings with other operations.

Fig 1

Good standard of warehouse facility – clean floor and high visibility

2.3.4 Where stevedores are using ship's equipment, eg lift trucks belonging to the ship, such equipment should be properly maintained and the controls should conform to the normal international standards for road vehicles.

2.4 Paper Reels

2.4.1 Paper is a sensitive commodity and should always be handled carefully. Careful handling is safe handling. There are many different types of paper rolls, such as newsprint, tissue, kraft coated board, kraft linerboard, printing paper, rolled pulp, directory paper etc. All these commodities have their different uses and characteristics. The rolls may weigh up to several tonnes each. They all require correct clamp pressure settings to enable the clamps to pick up the reels without damaging the product, but without dropping them either. Skilled drivers are required to handle paper products.

2.4.2 The following points should be noted -

- Rolls should always be stored under cover in a good quality warehouse. The floor should be smooth, firm and level. It is important that the floor will not impart any stones or other objects to the paper. Warehouses should always be well lit and well ventilated.

- Rolls should be well separated from other cargo and debris such as gravel, splinters or dirt that might cause contamination.

- A responsible person from the terminal should ensure that the warehouse floors where the rolls are to be stacked are thoroughly swept and free from all kinds of debris.

2.4.3 All equipment intended for the operation should be in proper working order. The surface of clamp blades should be inspected for possible defects. Clamp pressures should be adjusted for the type and weight of rolls to be handled so that all reels are adequately restrained.

Fig. 2

2.4.4 Roll trailers that are used for the transport of rolls from the ship to the warehouse or vice versa should have a flush and level surface with no sharp or deformed edges that might damage the cargo. Prior to use, the trailers should be swept clean and free from debris, loose objects or moisture that may cause damage.

2.4.5 The following points should be noted when handling by clamp truck:

- The transport of rolls from the vessel to the warehouse or vice versa should always be at a safe speed to avoid rolls falling off. Rolls should not overlap the edge of the trailer

- Operations should be suspended if tugmasters are unable to grip ramp surfaces due to ice, snow or other slippery conditions

- Lift truck drivers should not push or drag rolls on floors, trailer surfaces, decks or on top of other rolls

2.4.6 Special care should be taken in warehouses containing paper due to the height of the stacks. Vertical stacking is preferable and safer to stacking on the roll. There is always a danger that the chocking arrangements used to secure stacks on the roll might break loose

2.4.7 Paper reels should not be stacked to a height where the stack becomes unstable. Special care should be taken if the floor is not completely level. As the stack gets higher any small imperfection in the level will cause the stack to lean over

2.4.8 Rolls should always be stacked straight on top of each other. If not, 'lipping' may result and cause damage to the reel or cause an accident if one reel dislodges another

2.4.9 Only reels of the same diameter should be stacked together

2.4.10 Clamps with a combination of long and short arms should be used the correct way round to avoid damage to adjacent reels

2.4.11 When lifting more than one reel, all reels should be in contact with the clamp blades

2.4.12 Lift trucks should be fitted with overhead guards to protect the driver from falling reels

Fig. 3

Clamp truck double reel – note protective mat at base.

2.4.13 People working in paper warehouses should exercise caution around stacks of paper. It is possible that a lift truck working on the other side of a stack might dislodge a reel from an adjacent stack

2.4.14 Stacks should not be so high as to force drivers to operate at the extremes of their machines capability. If necessary they should use a more suitable machine, or the stack height should be reduced.

2.4.15 When stacking cargo, the lifting should be done only when in front of the stow. Conversely, when un-stacking, the load should be lowered immediately once removed from the stow. Drivers should never raise or lower their load while travelling.

Fig. 4

General warehouse view

2.4.16 The height to which paper reels may be stowed depends on the relationship between the diameter of the reel and the height of the stack. The height should be no more than three times the diameter (see fig 4).

2.5 Packaged lumber

2.5.1 Lumber is not normally a difficult or dangerous cargo to handle. Unless it is a high-grade material, it is frequently stacked outside where it is sorted to mark or size and eventually delivered to the customer. Lumber is usually handled by lift trucks fitted with normal fork blades or occasionally by side-loaders.

2.5.2 Normally the packs of lumber have bearers attached to the bottom that permit lift truck blades to penetrate under the packs and lift them easily. The packs are then stacked on top of each other to a safe height.

2.5.3 If for any reason the bearers have broken off, or were never there, the stevedores should place loose bearers between the packs to facilitate forklift handling and safe stacking.

2.5.4 Unfortunately a number of fatalities have occurred on timber terminals due to packs of lumber collapsing on unwary people checking the cargo.

2.5.5 These accidents have usually been caused either by lift trucks working on the opposite side of the stack causing it to wobble and fall over, or simply poor stacking and spontaneous collapse. It is therefore essential for managers to ensure that packs of lumber are well separated to make a safe and level stack, which will enable the forks to penetrate without 'pushing' the whole stack.

2.5.6 In particular it is essential to ensure that people on the ground keep well clear of operations and have regard for the possible dangers. In addition it can happen that a stack of lumber might look quite safe when first made, but over time it can develop a lean that becomes dangerous. Such leaning stacks should be re-stacked

2.5.7 Managers must ensure that lumber is stacked only to a safe height

2.5.8 Forklift blades should be set to match the length of the load and the centre of gravity. However in many cases packs of lumber will still extend well beyond the width of the machine and drivers should be careful not to collide with other cargo or dockworkers, or permit the load to become dislodged in transit

2.6 Baled wood pulp

2.6.1 Wood pulp is a widely traded commodity. Bales of wood pulp weighing about 250 kgs each are normally strapped together in units of six or eight bales making a unit of 1.5 to 2.0 tonnes each. The strapping usually takes the form of steel straps or wire bands (Cranston wires) that both hold the unit together and provide a certified method of top lifting. On the dock it is normal to handle wood pulp with clamp trucks that have vertical blades designed to squeeze several units together. Operatives should be aware of the following points -

- Clamping units should be done at the bottom bales of each unit
- Never push or drag units on the ground, floor or deck
- As with all paper products the warehouse should be clean, dry and free from contaminants such as splinters, stones, cargo residues and debris. Grain and plastic granules are a particularly serious contaminants and wood pulp should not be stored in warehouses that have recently held these commodities. This is because unacceptable foreign particles are incompatible with the subsequent paper making process
- If trailers are used to transport pulp to or from the ship, they should be in good condition and swept clean prior to use. They should have a flush surface and be free from rust, grease, debris or moisture. Random inspections should take place during the operation to ensure cleanliness

- As with any product, drivers should proceed at a safe speed to avoid units falling off. A unit of pulp is quite tall in relation to the size of its base and can easily topple over

2.6.2 In the warehouse, the pulp should be stacked to a safe height. Because wood pulp units are not always exactly the same size, and they are compressible, there is always a danger that stacked units may lean over or collapse. To overcome this, three main methods are employed:

2.6.3 Limit stacking to two, or maximum three, tiers

2.6.4 Place some form of dunnage at the edge of the stack to tie the stack together and tilt the units towards the centre of the stack

2.6.5 Stack the top tiers with units of pulp that have been banded together to form larger, safer units

2.7 Palletised paper and sheet materials

2.7.1 These commodities are usually packaged for handling by forklift. The term sheet material covers a wide range of plywood, medium-density fibreboard (MDF), veneers, fibreboard, oriented strand board (OSB), chipboard etc. These commodities are frequently shipped in packs about eight feet long and four feet wide, but may be larger or smaller. They normally have bearers on the bottom to assist forklift handling. Paper may be palletised in several forms such as, boxes of copy paper, reams, or rolls. All types of finished product are delicate and require careful handling. Many quality problems stem from careless handling, which may result in broken pallets, or damaged product. For example –

- Some sensitive products have ‘tier limitations’ to avoid crushing the bottom units. Operatives should be made aware if this is the case

- As far as possible packages with bearers underneath should be stacked with the bearers directly over the line of the bearers below in order to transmit the weight of the product directly through the bearers

- Forks should be set at the correct distance apart to fit the type of unit being lifted

- The forks should be slightly shorter than the item being handled so that the forks do not protrude and damage the pack behind. If they are longer it may be necessary to pick off the stack using a marker and then fully insert before travelling

- The forks should also be thin enough to pass freely beneath the unit being handled

2.7.2 Stacking should always be to a safe height. Any imperfections in the floor level will translate themselves into a leaning stack

2.7.3 Drivers should always work at a safe speed and carry the load about 10/15 cms off the ground, tilted slightly backwards. However on approaching the stack the load should be levelled to avoid any possible damage

2.7.4 Personnel working in the vicinity of a stacking operation should be aware of the dangers that a stack may topple over, or that the driver may have restricted visibility due to the load itself. Numerous fatalities have occurred due to forklifts reversing into unwary people. Generally speaking, people on the ground should keep clear of forklift operations. Because of the constant manoeuvring backwards and forwards that the job demands, it is not easy for the driver to be aware of every move that people make on the ground.

3 SAFE LOADING, STOWING AND DISCHARGING OF LIFT ON/LIFT OFF VESSELS

3.1 General safety points applicable to most vessels

3.1.1 Care should always be taken in planning, stowing, securing and discharging cargo to the master's satisfaction and in accordance with IMO regulations

3.1.2 Before beginning work an operations and safety meeting should take place onboard between interested parties such as the master, stevedores, surveyors etc. at which the working programme, safety, and all relevant matters are discussed, clarified and understood.

3.1.3 Safe and proper means of access to the vessel, cranes and holds should be provided.

3.1.4 All places where work is to be carried out must be safe and adequately lit.

3.1.5 Any enclosed or confined space such as a ship's hold or access may present a major risk to health or life because it has an atmosphere containing toxic fumes or vapours, or be deficient in oxygen. No one should enter any such enclosed space unless authorised to do so. Cargoes of wet logs, woodchips and green lumber may present significant risks. If a deficiency of oxygen is suspected the space should be considered dangerous and tested accordingly with an appropriate monitor, and then fully ventilated, and re-tested, before entry.

3.1.6 **A number of fatalities have occurred on forest products vessels because there was insufficient oxygen in the holds.**

3.1.7 Before loading, consider the possible ways in which problems can arise with forest products generally, and how these can be addressed. For example:

3.1.8 Salt-water ingress

Check for leaky ballast tanks, hatch cover leaks, hatch coaming drains blocked, condition of hatch cover packing, manhole covers, vent openings, and any pipe-work that passes through the hold

3.1.9 Fresh water ingress

This usually implies rain or snow. Caution should be exercised when working wood pulp in wet weather.

3.1.10 Condensation

The dew point should be monitored throughout the voyage and ventilation performed accordingly.
The rule is:

- if the dew point outside is below the dew point of the hold – ventilate,
- If not – do not ventilate. If a vessel has a de-humidifier, use it when necessary

3.1.11 Handling damage

Watch out for stevedore damage and careless handling

3.1.12 Movement at sea

A great deal of cargo damage is done when ships go too fast in heavy weather. Masters should be aware that forest products are a sensitive cargo and should treat them accordingly. If possible, avoid bad weather and/or consider weather routing. In the event of entering bad weather, do utmost to reduce rolling by slowing down or altering course. If possible avoid combining forest products with heavy bottom cargo because the vessel will become rather ‘stiff’ and suffer a shorter, more violent rolling period.

3.1.13 Contamination

Many cargoes are very sensitive to contamination by cargo residues, salt, rust, scale, splinters, plastic, burlap, oil, grease, foreign particles and taint generally. Hence the hold should be spotlessly clean and dry prior to loading. Try to avoid over-greasing the crane wires to avoid oily drips on the cargo. The underside of the hatch covers should be checked for paint flakes, cargo residue, rust etc. Hold cleanliness is absolutely essential

3.1.14 Non-delivery

This is usually due to a mistake with the tally. The vessel should make a tier count to ensure that the correct quantity is loaded

3.1.15 Inadequate securing or bad stowage

Always ensure that cargo is well secured by an appropriate method, such as air-bags

3.1.16 Loading and discharge operations

3.1.16.1 The following points should be checked before work commences:

- Only authorised persons should open, close or operate power driven hatch covers
- Adequate measures should be taken to protect any opening where stevedores could fall
- Decks and passageways should be free from oil or grease
- Items of loose stevedoring gear should be inspected and checked before use
- Disposable slings should only be used in accordance with their certificate
- Re-useable slings should have certificates, should be used in the correct manner and not exceeding their safe working load
- All vessel's cranes and cargo gear should be certificated and checked prior to use
- Stevedores, crane drivers and stevedore supervisors should be properly trained
- All stevedores onboard should be equipped with the correct safety gear such as hard hats, reflective jackets, safety boots etc
- No-one should be permitted to sit or walk on hatch coamings
- Safety ropes should be rigged round openings
- If the crane operator cannot see clearly into the working area of the hold or onto the dock, a signaller should be provided
- Cargo should not be lifted over people's heads, or conversely they should not stand in a position where cargo could fall on them
- When machinery (such as lift trucks) is used in holds, in addition to the normal dangers of manoeuvring previously mentioned, there are dangers from excessive noise, fumes, and driving difficulties over uneven surfaces
- Machinery should not be driven under suspended cargo. Trailers should be reversed under hanging loads.
- Smoking should not be permitted by those involved in the stevedoring operation either onboard or ashore.

3.1.17 Where specialised handling systems are used, some countries require that vessels carry a certificate covering the system together with instructions on how the system should be used to ensure safe handling. The ship should ensure that a copy is given to the stevedores before handling commences

3.1.18 Care should be taken in breaking out cargo when commencing discharge. After the careful removal of air bags and other securing or protective items, care should be taken to commence discharge at the point where the last cargo was loaded. This avoids attempts to pull out tightly stowed cargo, avoids cargo damage, is safer, and avoids overloading lifting equipment.

3.2 Paper Reels

3.2.1 Most forms of paper may be regarded as 'sensitive products' that require skill and care in handling. The cargo should be kept clean, dry and free from contamination. Careful planning and hold preparation are essential. The hold intake and stowage factors will vary considerably according to the wide range and size of differing reel products. Prior to loading, the cargo should be inspected for possible defects. Paper reels should usually be lifted in the 'upright' position (eye to sky).

3.2.2 With regard to stowage it is important that the holds are clean and dry and suitably lined with protective paper or cardboard where necessary. Reels may be stowed in 'soldier' fashion or nested. Nested rolls take up about fifteen percent less space and form a tighter stow. It is important to sort the cargo by size in order that the stowage is level. From time to time it may be necessary to 'floor-off' with plywood to ensure a secure and level stow. It is important that any gaps are 'staggered' between tiers. On completion of loading, the reels should be well secured to avoid movement or chafe. This is best done by the use of air bags.

3.2.3 Machine stowing reels in vessels

In a warehouse operation, paper reels can be stacked with a small space between each row to enable clamp trucks to work without danger of contact with adjacent cargo. However, in the hold of a ship the cargo should be tightly stowed to avoid movement on voyage. Paper reels should be protected from direct contact with steel decks, bulkheads, weld seams, or sharp edges by kraft paper, cardboard, or other protective material. Lift truck drivers should ensure that reels are placed squarely on top of, and against each other, and that the long and short arms of the clamp are correctly used. Care should be taken to avoid damage. All normal safety precautions (already mentioned) should be observed when using lift trucks in a confined space with other people present. On completion, the cargo should be secured by methods that will not cause damage, such as airbags (reels should never be secured in a way that results in direct contact with wires or chains)

3.2.4 There are a number of different lifting methods, such as

3.2.4.1 Head clamps

Head clamps are designed so that by the action of lifting they exert pressure onto the sides of the reel. The friction between the clamp 'blade' and reel is sufficient to grip the reel for lifting. Some head clamps work by

a scissor action, others by a wire or chain that connects the two blades together. Head clamps may be used in conjunction with a spreader to enable numerous units to be lifted simultaneously. Stevedores attach the clamps to the appropriate number of reels, a test lift is made, and if all looks well the cargo is hoisted. It is usual for head clamps to self-release when the weight is off. It is important to set the equipment correctly so that the reels will hang comfortably (just touching) when lifted. Head clamps are particularly suitable for use in open hatch vessels where the cargo can be loaded or discharged directly to or from its stowage position

Fig. 5

Fig. 5 a

3.2.4.1.1 There are some objections to the use of head clamps, for example

- The clamp blades may make an undesirable Impression on the reels
- If a reel or the frame is jolted for some reason, such as collision with the hatch coaming or a similar object, the reel may fall out of the clamp and cause injury
- A reel may fall spontaneously due to lack of friction
- This method requires significant manpower when attaching the clamps - at least one man per two clamps

3.2.4.2 Vacuum clamps

Vacuum clamps are commonly used for lifting reels of newsprint, but can also be used for some other types of paper. They are particularly suitable for use with open hatch/ gantry vessels where it is possible to lift reels directly to or from their stowage position, and the cranes have sufficient capacity to lift and power them. However the product should be suitably prepared for this method of lifting, having an airtight plug in the bottom of each reel and a suitably designed wrapper. The top plug may need to be removed or otherwise designed to allow the vacuum to operate correctly.

Fig 6

3.2.4.2.1 The clamps themselves form a multiple unit of 'suction pads' that are attached to, and powered by, the ship's crane. This unit is carefully lowered over the appropriate number of reels so that each suction pad is directly over one reel. The crane driver applies the vacuum, makes a test lift, and then hoists the cargo if all appears well. The vacuum clamps can be adjusted to accommodate various sizes of reel (within limits) and can also be adjusted to stow either soldier or nested pattern.

3.2.4.2.2 Vacuum clamps have some advantages over head clamps:

- Less labour required
- No danger of imprints on the side of the reel
- However, they represent considerable capital investment, not all ships can power them, and they can only be used on selected products.

3.2.4.3 Jensen slings

The Jensen sling consists of a belt arrangement, which is passed over one or more reels (typically about four), in such a way that when the sling is lifted – the belt tightens round the reels and they are lifted by friction. Once landed, the belt becomes slack and is removed. With this method it is not normally possible to stow reels direct into their final stowage position. An appropriate clamp truck should be used to stow the reels. The same dangers of handling apply to this method, as do the possible ways that the cargo may be damaged. This method is not widely used today and has the added disadvantage that the cargo is 'double handled'. However on some vessels, such as 'tween deckers, or semi-open bulk carriers it is not possible to load cargo direct to its final stowage position due to the deck overhang, and Jensen slings can be used to advantage. Cargo being stowed under this area has to be machine stowed anyway.

3.2.4.4 Platform racks

In the absence of any other suitable equipment it is possible to load paper reels onto a platform rack and then hoist it into or out of a vessel. This method implies loading and discharging the rack with clamp trucks, which in turn implies additional handling, with the added need for using machinery in the hold.

3.2.4.5 Core slings

Some products such as rolled wood pulp and tissue may be lifted by core slings, which comprise a textile-lifting sling attached to a metal plate. The sling is passed through the core of the reel leaving the plate underneath to provide lift. Core slung cargo may be lifted with a suitable frame on which the lifting hooks are arranged according to the diameters and configuration of the cargo. This method is best suited to open or semi-open vessels where the cargo can be accessed directly to or from its stowage position.

3.2.4.6 Core probes

A core probe is a device that is placed into the centre of a reel and then expands when lifted. When a reel is landed and the weight comes off the lifting wire, the core probe self-releases. This method is often used with kraft linerboard, but can also be used with other suitable reel products. The size of core probe should be compatible with the size of core, which can vary.

3.2.4.6.1 Core probes can be arranged on a frame and configured according to the diameter of the reels, the weight of the cargo, and whether nested or not. They are ideal for use in open or semi-open hatch vessels but can be used in most circumstances where cargo is directly accessible. The safety aspects and the dangers of cargo damage are much the same as with other top-lifting methods.

3.2.4.6.2 Care should be taken to ensure that the product is suitable for core probe lifting. If the winding of the reel is not tight enough, the core may pull out or telescope.

- Core probes should only be used with the agreement of the shipper or receiver.

Fig. 7

Core probe automatically adjustable for core diameter.

3.2.5 With regard to safety, many of the same dangers exist with vacuum clamps as with head clamps. For example:

- One or more reels may fall off due to loss of vacuum
- One or more reels may fall due to a severe jolt
- If there is a fault or loss of electrical power the vacuum is usually 'frozen' giving time for the reels to be landed, or people to stand clear

3.2.5.2 One of the dangers of working in holds where large paper reels are stowed is that the gaps between reels may be large enough for stevedores to fall between, and great care should be taken.

Fig 8

3.2.6 There are a several possible causes of cargo damage:

3.2.6.1 Impressions or indents made on the reels by the head clamps.

3.2.6.2 The product in question should be tested for compatibility with the intended clamp. It may be that another variety of clamp or a larger clamp face is more suitable

- Landing reels too heavily can cause damage to the bottom or the edges
- Careless landing of (empty) head clamps onto reels prior to attaching them can cause damage or indents to the top web of the reel
- Contact with the hold sides when hoisting or lowering
- Contact with other cargo when hoisting or lowering
- Poor securing
- Chafe damage, caused by reels vibrating or moving at sea
- Dropping reels due to incorrect placing of head clamps
- Ingress of water caused by poor hatch seals

- Working in heavy rain

3.2.6.3 Careless crane driving is another frequent cause of damage and supervisors should remain alert to this.

3.2.6.4 Condensation.

Careful attention to ventilation is needed when transporting paper reels due to the various climatic conditions and seasons through which a vessel may pass.

3.2.6.5 Whenever cargo is lifted there is always a danger of equipment failure or of heavy pieces of cargo falling from a considerable height. Personnel should always stand well clear and remain alert at all times.

3.3 Baled wood pulp

3.3.1 Wood pulp is produced in many parts of the world, such as U.S.A., Canada, Brazil, Chile, New Zealand, Indonesia and Europe. There are many grades of wood pulp such as long fibre, short fibre, bleached, unbleached etc., which have different qualities and are used in different processes. Most wood pulp is used in the paper industry, but a proportion is also used in the manufacture of fibres, textiles, films and absorbent materials.

3.3.2 Pulp is normally made from the cellulose fibres found in wood. These fibres have to be separated from the adhesive-like substances called lignin, a resin that binds them together. There are two main methods. The first is a purely mechanical process, and the second involves a chemical treatment process. The resulting product is usually made into in sheets that are dried, baled and unitised for shipment. It is known as bleached kraft pulp (BKP). Most market pulps are dried to about 85-90% dryness).

3.3.3 Bales of wood pulp normally weigh about 250 kgs and are strapped together in units of 6 or 8 bales giving a unit weight of 1.5 to 2.0 tonnes. The stowage factor is around 1.3 - 1.4 cbm/tonne in a box hold. The steel strapping wires are normally designed and certificated for top lifting.

3.3.4 Some types of pulp are made into reels of about 0.5 to 1.0 tonnes. This type of ‘rolled’ pulp is normally used in continuous processes, such as the manufacture of absorbent materials. (for instance, fluff pulp). Rolled pulp is sometimes unitised through the core with core slings for lifting with normal hooks, or alternatively shipped as loose reels and handled by clamp trucks, head clamps, or similar equipment. It is extremely sensitive to wet damage or contamination.

3.3.5 To lift baled wood pulp, a lifting frame is normally employed to load multiple units of baled wood pulp. Each unit should be lifted by two approved hooks suspended from the frame, and if necessary separated by a spreader bar. The angle of the lifting wire strapping to the bridle should not exceed 40 degrees from the vertical. It should be ascertained from the wire certificate if the unitized arrangement is for a single or multiple lift, which should not normally exceed four lifts. A lift should never be left suspended for more than three minutes due to the great strain on the lifting wires. The hooks may be manual or semi-automatic. When loading, the hooks and spreaders should be arranged so that the end units of the lift are drawn together making a compact

hoist. When discharging it may be helpful to arrange the hooks and spreaders in such a way that the units separate slightly and permit clamp truck handling ashore without damage to the product.

3.3.6 Semi-automatic frames may be powered by their own compressor, or otherwise fitted with bottles of compressed air or preferably nitrogen gas. Semi-automatic hooks self-release, so less labour is required.

Fig 9

General view of pulp open hatch discharge.

3.3.7 In open or semi-open hatch vessels the cargo can be drop-stowed into its final stowage position, care being taken to ensure a tight stow. In non-open vessels it is necessary to use clamp trucks in the hold to stow the areas under the overhang, and then drop-stow the square. In large conventional bulk carriers it may be necessary to 'floor off' at certain levels in the hold to allow the clamp trucks to operate at the higher floor levels. The flooring off is usually done with removable steel plates. This process is not ideal due to possible cargo damage resulting from steel plate handling, clamp truck driving or the danger of oil drips or broken hydraulic hoses. It is advisable to place kraft paper between the steel plates and the pulp.

3.3.8 Preparation for loading

3.3.8.1 Before loading, consider the possible ways in which problems can arise with pulp and how these can be addressed (see 3.1.6 for general issues).

3.3.8.2 Salt water ingress
Salt water is a contaminant for all types of pulp

3.3.8.3 Fresh water ingress
Some types of pulp are more sensitive than others, and most should not be worked in wet weather

Fig. 10

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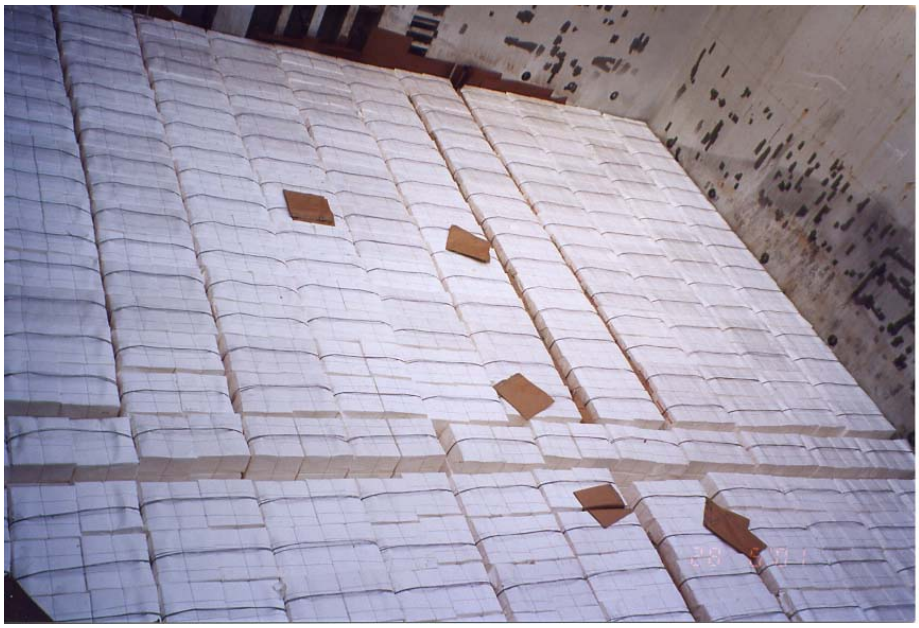

Pulp – well stowed with airbag securing

3.3.8.4 Condensation

Do not fill ballast tanks adjacent to wood pulp, unless absolutely necessary. They might leak, but in any case condensation is likely to occur against the cold surface.

3.3.8.5 Handling damage

Wood pulp should be kept as clean and dry as possible at all times. There will usually be some scuffs and tears but the overall appearance should be clean. Surfaces on which the pulp is placed should be clean and dry whether it is on the dock, in the shed or on the trailers

3.3.8.6 Contamination

Pulp is very sensitive to contamination by cargo residues, salt, rust, scale, splinters, plastic, burlap, oil, grease, foreign particles and taint generally

3.3.9 Stowage planning

3.3.9.1 Prior to loading, the cargo should be inspected in the warehouse to ascertain the general condition and to establish an approximate percentage of units scuffed, or with torn wrappers, stains, etc. During loading the deck officers should check the units for dirty bottoms or other damage. If necessary, cargo documents may be endorsed accordingly

3.3.9.2 When planning the stowage, the following are amongst the factors to be taken into account

- Load line requirements.
- Stability, stress and trim at all ports involved.
- Proposed load/discharge rotation.
- The configuration of the cargo space. In some vessels the shape of the bilge, the size of the overhang, or other irregular shape in the hold may make the stowage of pulp rather difficult or require 'benching' to be installed.
- Cargo space limitations such as tanktop loadings.
- Special conditions of the charterparty or the type of pulp involved.

N.B. In all cases the size of the units should be accurately known and the intake of any hold should be calculated from the size of the unit, the number of units per tier, and the number of tiers that can be loaded

3.3.9.3 When stowing and securing wood pulp it must be recognised that it is impossible to secure a loose stow. The cargo should be stowed as tightly as possible. To do this, stow against the bulkheads first and ensure that each lift is 'banged' into the previous lift to close any gaps. The lifting wires should run athwartships, except in the centre where there may be a narrow channel requiring some fore and aft units. Broken stowage should be staggered in each tier

3.3.9.4 Ensure that the tank top is covered with suitable kraft paper or wood pulp sheets to keep the cargo from contact with the steel. If necessary build a fence of flat dunnage against irregular or corrugated bulkheads.

3.3.9.5 Where gaps of 40 cms or more occur they should be bridged. If available, airbags should be used on every tier where there are significant athwartship gaps. If there is a large gap, but which is not large enough for an extra unit, consider creating two smaller gaps. Never use double airbags.

3.3.9.6 Unit wires should not cross other unit wires. If unavoidable, separate with suitable material.

3.3.9.7 The cargo must be protected from any sharp edges or weld seams, which may chafe during passage.

3.3.9.8 The top tier(s) should be air-bagged solidly and airbag pressure monitored and maintained during passage.

3.3.10 Tie-back

3.3.10.1 In vessels with an overhang at the fore and aft ends of the hold it may be unavoidable that some units of wood pulp have to be stepped back in the upper tier(s) due to inaccessibility by the lifting frame. This means that there will be a void space and some units will not have contact with the transverse bulkheads. However these units should be secured. One of the traditional ways to do this is by the use of sisal rope to tie the lifting bands of the outer units to the lifting bands of some inner units. The rope can be tightened with a 'Spanish windlass'. Units of the upper tier may then sit on the rope ties adding further to their effectiveness. A better form of 'tie-back' is known as 'envelope lashing' whereby lashings are laid out over the fore and aft ends of the completed tier of pulp and secured to inner units at least four units back from the face. The next tier, which is stepped back from the bulkhead, is then loaded on top of the lashings, which are then passed over this tier and secured to lifting bands on top, creating an 'envelope'.

Fig. 11

Lashing to tie back cargo.

3.3.10.2 A modern method of securing such units is by a 'web lash' system that is widely used to secure forest products to flats and in containers. This system consists of a special buckle used with 'one-way' webbing, which can be winched tight with a type of ratchet. In theory this method should achieve a strong and secure 'tie-back'. However some shippers are reluctant to use this method for fear that fragments of lashing material might contaminate the pulp.

3.3.11 Fire risk

3.3.11.1 Paper pulp will burn. During handling and carriage, abrasion between bales can produce significant quantities of cellulose 'fluff' that is particularly inflammable. A strict policy of no smoking should be enforced and precautions should be taken to avoid sparks from entering a hold of wood pulp. Oil contamination is particularly serious because it can oxidise and result in self-heating.

3.4 Logs

3.4.1 Recommendations for the carriage of logs are contained in the IMO Code of Safe Practice for Ships carrying Timber Deck Cargoes.
Timber means - sawn wood, cants, logs, poles and pulpwood.
The purpose of these notes is to summarise the methods of loading logs and to illustrate any possible dangers. It is not intended as a definitive guide to the regulations.

3.4.2 Logs may be shipped in the form of single, large, mature hardwood trees, or as bundles of smaller pulpwood logs. They may be loaded at a jetty, or direct from the water.

3.4.3 Loading from water

The following extract from the US Safety and Health regulations covers the subject of log operations:

3.4.3.1 When working logs in holds and using dumper devices to roll logs into the wings, the employer shall ensure that the employees remain clear of the areas where logs are being dumped that could strike, roll upon, or pin them,

3.4.3.2 Personal flotation devices shall be provided for all employees working on a log boom

3.4.3.3 Labour shall be provided with appropriate footwear such as spiked shoes.

3.4.3.4 A Jacobs ladder, meeting the appropriate requirements, shall be provided for each gang working alongside, unless other safe means are provided.

3.4.3.5 When employees are working on rafts or booms, a rescue boat shall be available.

3.4.3.6 When employees are working logs out of the water they shall be provided with 'walking sticks' which are long floating working areas no less than 60 cm wide.

3.4.3.7 When loading from the water it should be assumed that the logs will be saturated and the safe working load of the equipment should be selected accordingly.

3.4.4 **Stowing logs under deck**

The better the under-deck stowage, the more cargo can be safely loaded on deck.

3.4.4.1 Before loading, a pre-stow plan should be made showing the expected intake according to the capacity and configuration of the holds.

3.4.4.2 Bilge strainers should be clean and effective. Bilge pumps should be tested.

3.4.4.3 Logs should be hoisted from as close as possible to the ship to minimise swinging. They should be gently lowered into place and stowed compactly. The crane operator and /or hatch tender should ensure that the load is horizontal before attempting to lift it aboard the vessel

3.4.4.4 Logs are generally loaded in a fore and aft direction. Loose tackle or machines may be used to manoeuvre the logs into the sides or ends of the holds. Alternatively they may be lowered at an angle and slid into the ends of the holds.

3.4.4.5 Void spaces should be chocked by dunnage.

3.4.4.6 Draft surveys should be made periodically to check the weight of the cargo, which is notoriously difficult to ascertain by other means. This will be very helpful when it comes to calculating the amount that can be safely loaded on deck. The shipper's declared weight should never be used for stability calculations.

3.4.5 **Stowing logs on deck**

3.4.5.1 The stability criteria such as GZ and GM requirements are contained in the code of safe practice. The essential parts are summarised below.

3.4.5.2 The ship should always have positive stability bearing in mind the following

- The increased weight of timber due to water absorption or ice accretion
- The consumption of fuel and fresh water on passage
- The free surface effect of liquid in tanks
- The weight of water trapped in broken spaces within the logs

3.4.5.3 The initial GM of the vessel should be adequate for stability purposes but ideally should not exceed 3 percent of the beam. A high GM will result in a short and violent rolling period that will put heavy stress on the lashings.

3.4.5.4 The principle of safe carriage of timber on deck is to make the stowage as solid and compact as possible. This will produce a binding effect within the stow and reduce permeability.

3.4.5.5 Prior to loading the following should be prepared

- Hatch covers and other openings that are not used for normal ship working should be closed.
- Air pipes and ventilators should be protected
- Lashing material should be examined and made ready.
- Cleats welded to bulwark for securing stanchions (if necessary)
- Hog wires prepared
- Lashing chains put ready
- Shackles, roller shackles, snatch blocks and turn buckles greased ready

Fig. 12

General view of deck lumber cargo.

3.4.5.6 If the vessel is fitted with uprights, these should be erected. If not, portable wooden stanchions should be used. In the absence of uprights, vessels employed in the log trades are usually fitted with stanchion sockets. Portable wooden stanchions can be 7 or 8 metres long and weigh close to a tonne each. They are not nicely sawn, but more likely to be small tree trunks. They have to be lowered into place and secured to the bulwark by some means such as a wire grommet. The bottom end of the stanchion is secured by wedges driven into the stanchion socket

3.4.5.7 If loading bundles of pulpwood, the normal size of a bundle will be about 2 to 3 metres long and 1.5 to 2.0 metres in diameter. It is possible that the securing bands are also certified for lifting, in which case the bundles are simple hooked on to a spreader or other arrangement and lifted four or six at a time. Pulpwood is measured in cubic metres but this does not give any clue to the weight or stowage factor. Typically the average weight of a pulpwood unit is between 4 and 5 tonnes.

3.4.5.8 When about two tiers have been completed on deck, the hog wires may be rigged. The hog wires are passed round the wooden stanchions and secured across the cargo from side to side. They should not be made

taught, only hand tight. When the next tier of logs is loaded the wire becomes taut and pulls the stanchions inboard, counteracting their tendency to incline outwards with the weight of cargo. Hog wires may be inserted at other intervals in the stow, for example every two tiers.

3.4.5.9 The forward part of the cargo should be sloped down so as not to present a 'wall' to head seas.

3.4.5.10 It is important to bear in mind the deck and hatch-cover loading limitations.

3.4.5.11 In a seasonal winter zone the height of the deck cargo must not exceed one third of the beam.

3.4.6 Lashing

3.4.6.1 When loading is complete the cargo should be lashed as follows:

- the spacing of independent lashings should be no more than 3 metres apart.
- A wiggle wire, rove in a shoelace fashion between a series of blocks and attached to a winch should also be rigged.

3.4.7 Safety factors

3.4.7.1 Sensible precautions should be taken when working near the edge of a large deck cargo.

3.4.7.2 Pulp logs become very slippery when wet.

3.5 Packaged lumber

3.5.1 Packaged lumber consists of numerous pieces of sawn timber banded together into a pack, typically a metre or so wide, a metre high, and almost any length up to six or seven metres. Usually the packs have bearers at the bottom to facilitate fork-lift handling. The type of wood varies widely according to its origin and intended use. Softwoods from temperate climates may be used in the building and construction industries, while hardwoods from tropical areas tend to be used for higher quality work such as furniture making and doors. Not only do the sizes of packs vary, but also the length of the individual planks may vary within the pack. Timber destined for the pallet industry is shipped in short packs about one metre cube – sometimes known as TV sets. The weight of packaged timber varies according to the type of wood, the moisture content, the density, and the amount of broken space within each pack. Hence timber is usually measured in cubic amounts such as cubic metres or board feet according to the custom of the trade. When experience is gained in various trades it is possible know the approximate weight of certain types of timber. Some timber is shipped green, some is air-dried, and some is kiln dried. It is important to know which types of timber it is permitted to ship on deck. This may depend on the terms of shipment or the custom of the trade.

3.5.2 When loading into Lo/Lo ships the cargo may or may not be pre-slung. If not pre-slung the stevedores will lift several packs together with their own wires

or belt slings. The number of packs will depend on the safe working load of the crane and the weight and size of the packs. In open hatch vessels the cargo can be dropped into its final stowage position, one end of the slings unhooked and the slings pulled out ready to be used for the next lift. If the cargo is pre-slung it can simply be unhooked.

3.5.3 In conventional bulk carriers which may have deck overhangs up to 8 metres each side of the hatch opening, it is necessary to land the cargo in the square for stowing out into the wings with forklifts. Such vessels may have the additional complication of a sheer or lower side tanks that make stowage difficult. These difficulties may be overcome by additional dunnaging, benching, or using a stowage pattern that suits the individual circumstances.

3.5.4 When using pre-slings with timber it is important to try and avoid the slings being cut by the metal bands of the packages, and also that the slings do not become trapped or crushed within the stow. If possible, the loose ends should be tied up in such a way that they are easily accessible at the discharge port. It is also important that the lifting arrangements (or frame) are set in such a way that the slings have a reasonably straight pull to avoid them sliding and chafing from a diagonal force.

Fig. 13

Packaged lumber discharge

3.5.5 When discharging pre-slung timber the production rates are usually very good. It is a relatively simple operation. However, in accordance with the ILO Code of Practice, the slings should be examined by the hold workers to

ensure that they have not been cut or chafed during the voyage. Unslung timber is more difficult to discharge because stevedores have to use a sling to 'weigh the ends' (i.e. lift the ends of a few bundles slightly) in order to get the lifting slings on, and then re-lift when the lifting slings are safely in place. The process of weighing the ends is not intrinsically dangerous, but there are many opportunities for the stevedores to crush their fingers or toes when struggling with a tightly stowed cargo. If the cargo which was machine stowed in, it should come out in the reverse manner.

3.5.6 Stevedores should be discouraged from 'dragging out' cargo from under wings due the dangers of swinging loads.

Fig. 14

Machine stow: note restriction created by wings.

3.5.7 There are numerous dangers when working in holds with timber, for example.

- Falling down gaps in the stow
- Falling down corrugated bulkhead voids
- Working with machines on uneven surfaces
- Working with loose steel plates
- Equipment failure causing cargo to fall out the slings
- Swinging loads
- Careless crane driving
- Atmosphere deficient in oxygen

3.5.8 All too often stevedores have been killed by the collapse of a timber stow during discharge. Attention is drawn to the hazards of shifted or unstable stows due to heavy weather or poor stowage at the load port. As far as

possible, cargo should be loaded and discharged by horizontal layers. This avoids leaving vertical faces that may be liable to collapse.

3.5.9 Damage prevention

3.5.9.1 Timber is often loaded in the rain and provision should be made to keep bilges pumped dry at all times. This helps to avoid fungal growth, blue staining and rust stains

3.5.9.2 For lifting, rope or webbing slings are preferable to wire slings. Wire slings tend to cut into the lower corners of the bundles.

3.5.10 Timber deck cargo

3.5.10.1 The extensive requirements for loading packaged timber on deck are contained in the code of safe practice for the carriage of timber deck cargoes, which should be referred to in all cases. The main points may be summarised as follows:

3.5.10.2 Deck cargo shall be so distributed and stowed so as –

- To avoid excessive deck loading
- To ensure that the ship will retain adequate stability at all stages of the voyage bearing in mind wind moments, the consumption of bunker fuel and stores, and the possible increase in weight of the deck cargo due to the absorption of water or icing.
- Not to impair the weather or watertight integrity of the vessel
- Not to interfere with the safe navigation of the vessel
- Not to interfere with the normal working of the ship
- logs and packaged lumber are not intermixed

3.5.11 Cargo slings must have a certificate and any limitations should be advised to the stevedores

3.5.12 Wrapped lumber should not be placed on the outside two edges of the stow to ensure workers do not slip off the vessel

3.5.13 Uneven length lumber packages should not be wrapped to prevent tripping.

3.6 Palletised paper

3.6.1 Palletised paper may be prepared in rolls, reams, or A4 packs and then palletised. The contents of the pallet are sometimes protected by top boards, corner pieces or shrink wrapping. Certain products may be subject to a tier limitation. Careless handling easily damages all of them.

3.6.2 In some circumstances the pallets may be lifted with slings passed through or under the pallet. However if the pallet is not strong enough there is a danger of crushing the pallet by the inward pull of the sling. Another method is to use a pallet fork that is suspended from the crane and has forks designed to pass through the pallet. This method avoids crushing damage. Failing this, a flat rack might be used to lift pallets in and out of the ship to avoid any lifting damage.

3.6.3 The methods of stowage will vary with the type of vessel, such as open hatch or conventional vessel. In open hatch vessels the cargo can be placed directly into its final stowage position, whereas forklift trucks are required in conventional vessels to re-handle the cargo and stow it in the wings.

3.6.4 When lifted by slings, small pallets tend to be rather unstable and care should be taken to sling them correctly. The usual precautions regarding the use of machinery in holds and standing clear of hoisted cargo should be observed.

3.7 Sheet materials

3.7.1 Sheet materials (plywood, chipboard, OSB, MDF and similar) are usually banded together in reasonably uniform packages, frequently 2.44 x 1.22 x 1.0 m, with bearers on the bottom to facilitate forklift handling. The packs are sometimes well protected by corner pieces, top and bottom boards etc., but sometimes not well protected at all - as in the case of pine plywood, which sometimes has no protection whatever. Sometimes the sheets are made with tongue and groove edges that are particularly vulnerable to handling damage.

3.7.2 These materials are well suited for lifting with textile slings that normally do not damage the corners of the packs in the way that wire slings can. Multiple lifts can be made with two or three packs on top of each other connected in groups to a lifting frame. The full capacity of the cranes can be used and the cargo can be pre-slung with great advantage. Depending on the type of ship, the cargo may be drop stowed or machine stowed.

3.7.3 Great care should be taken to secure sheet materials with suitable chocking and/or airbags. If the cargo moves during passage there is a tendency for the packs to deform ‘diagonally’. Eventually they split open and the loose sheets slide everywhere. The cargo is then said to be ‘shot’.

3.7.4 With regard to safety, normal precautions for Lo/Lo vessels apply.

4 SAFE LOADING, STOWING AND DISCHARGING OF RO-RO VESSELS

Please read in conjunction with ICHCA pamphlet #10 "Safe working at Ro-Ro terminals", and section 2 of this booklet

4.1 General safety points

4.1.1 The following points should be checked prior to commencement of work:

- Decks and passageways should be free from oil or grease
- Tugmaster drivers should be qualified
- When working Ro-Ro or STO/RO vessels with forest products on roll trailers, drivers should engage the lowest gear when transiting ramps fully laden
- Drivers of tug masters should never change gear on ramps.
- Safety chains connecting the trailer to the towhead should be fixed at all times.
- Where possible Mafis should be equipped with permanent hooked cheeks, which are designed to locate into wings attached to either side of the gooseneck. Otherwise it is preferred that when using goosenecks, the Mafis are towed down and pushed up ramps. This reduces the risk of disconnection and also applies maximum weight to the tug wheels assisting with traction and braking.
- Trailers to be kept low to the ground, but care taken to adjust the height when approaching a change in slope or any other reason.
- It is important that the weight of the load handled on ramps is within the towing and braking capacity of the tug, and within the safe working load of the ramp itself.
- Avoid sharp turns with roll trailers
- Always drive at a safe speed
- Pedestrian areas should be clearly marked
- On STO/RO vessels it is important to keep pedestrians separated from lift trucks working at the cargo face
- Rules for traffic flow to be clearly understood.
- Caution to be exercised when working near machinery in confined decks
- Respect tidal conditions which may make the ramp too steep at certain times

- Working areas should be well ventilated

4.2 Paper reels

4.2.1 Roll trailers used for the transport of cargo to or from the vessel should be suitable for the intended purpose. I.e. flush surface, clean, dry and free from any debris or objects that may imprint the underside of a reel.

4.2.2 Reels should not overhang the profile of the trailer

4.2.3 Onboard, the reels should be protected by cardboard or other suitable material from direct contact with steelwork, frames, weld seams, edges, expanded metal grids or any other sharp surface.

4.2.4 The clamp truck blades should be set to the correct pressure for the intended cargo, inspected for damage or deformation, and the truck itself should be in good working order and free from oil leaks.

4.2.5 Clamp truck drivers should transport reels level and close to the deck, but they should avoid dragging or pushing reels on the floor or deck. If there is a delay in the operation, reels should be rested on the deck or ground.

4.2.6 Rolls of similar diameter should be stacked together and landed straight on top of each other without overlapping. It is however permissible to load reels of different heights together.

4.2.7 The cargo should be secured with airbags and/or lashings. The reel edges should be protected from lashings by special ‘corner pieces’.

4.2.8 Rules for lift truck handling (2.3) also apply when used in Ro-Ro vessels.

4.2.9 The main dangers when loading or discharging reels in Ro-Ro vessels are

- Dropping reels due to careless driving or incorrect clamp pressures
- Reels falling from roll trailers due to reckless driving or incorrect loading
- Exhaust fume build-up because of inadequate ventilation
- Personnel working in a confined space with machinery always manoeuvring
- Attempting to use clamp trucks beyond their capacity
- Lift trucks trying to carry reels too high, and turning over in consequence.
- Collision with ship’s structure because of a failure to observe the amount of overhead clearance when entering decks.

4.3 Baled wood pulp

4.3.1 The clamping of units should be done at the bottom bales, and the units lifted lengthways to avoid damage to the unitising wires.

4.3.2 Units of pulp should never be pushed or dragged along the deck, floor or ground.

4.3.3 The rules for careful driving on ramps etc apply to wood pulp

4.3.4 The dangers of handling wood pulp in Ro-Ro vessels are similar to those already described in 'paper reel' handling

4.3.5 All the rules of good housekeeping and cleanliness (mentioned for paper reel handling) apply to wood pulp. Wood pulp is sensitive to taint, contamination and wetting. Prolonged wetting can cause units to swell, breaking the bands, affecting the product, and exerting pressure on the vessel.

4.3.6 The pulp should be stowed as tightly as possible by suitable clamp trucks equipped with bale clamps. The clamps should be set to the correct pressure. Gaps in the stow should be air-bagged.

4.4 Packaged lumber

4.4.1 The handling of packaged lumber in Ro-Ro vessels does not normally present any special problems. The timber is delivered to the appropriate deck by Mafi trailer and stowed with a normal forklift truck. It should always be remembered to use a truck with the correct lifting capacity and the correct mast height for the space concerned.

4.4.2 Problems may occur if the length of the packs is rather long. The forklift takes them off the trailer and then may turn through 90 degrees or more to face the stowage position. This means that the ends of the pack will describe a large arc and may endanger personnel or cause a dangerous collision with a pillar or part of the ship's structure. In the case of very long packs (for example flooring material) it may be necessary to use two forklift trucks in tandem. They lift up the long pack, move backwards together, and then the Mafi trailer is withdrawn to enable stowage without turning the load.

4.4.3 Using two lift trucks together in this way is a potentially hazardous operation that should only be carried out by experienced operators in accordance with a safe system of work and under close supervision.

4.4.4 Where required, blocks should be placed on the deck at the edge of the lumber unit sticker to ensure that the stow leans against the previous tier.

4.4.5 In some Ro-Ro trades, packaged lumber is unitised into 'jumbo packs' of 20 tonnes or more. This implies that the jumbo packs be handled by a large capacity machine, usually direct from the shore into the ship and vice-versa. If the size of the jumbo pack restricts the driver's vision, the machine should be reversed where safe and practicable.

4.4.6 The usual precautions regarding work in the proximity of machinery should be observed.

4.5 Sheet materials and palletised paper

4.5.1 As with timber, pallets and sheet materials do not present great problems. They are ideal for forklift handling and well suited for carriage in Ro-Ro vessels. Where appropriate, tier limitations should be observed.

4.5.2 It is imperative that the length of the fork blades is compatible with cargo, so that the forks do not stick out beyond the packs or pallets and cause damage to the cargo behind. Care should be taken to stack the cargo neatly and secure it well with airbags and/or chocking and lashing. As mentioned plywood bundles are easily 'shot' if not properly secured.

4.5.3 The usual precautions when working with machinery in cargo decks should be observed.

5 THE CHARACTERISTICS OF VARIOUS VESSELS IN THE FOREST PRODUCTS TRADES

5.1 General

5.1.1 Until the 1960s nearly all dry cargo was carried in general cargo ships. After that there were significant developments in ship design and specialised ships began to appear in many sectors. Since then, numerous ship designs have appeared which are suitable for the carriage of forest products, either as multi-purpose vessels, or specialised vessels. The choice of ship design will depend on many factors such as the needs of the cargo, and the intended trade routes. Market forces have obliged ship owners to look for innovative ways to carry forest products with zero damage.

5.2 Conventional handy-size bulk carriers

5.2.1 These ships range in size up to about 50,000 tonnes deadweight and may be regarded as multi purpose vessels. They typically have five holds with four slewing cranes. They are employed in the carriage of bulk cargo such as coal, grain, fertiliser, minerals etc, but are also suitable for the carriage of logs and/or packaged lumber. They are frequently equipped with log stanchions and usually have securing points for timber deck cargo.

5.2.2 Typically the hatch opening is small in relation to the area of the hold. Approximately fifty per cent of the hold may be directly accessible and the remainder is 'under the wings'. They are normally single hull vessels with upper and lower wing tanks. The end holds often have pronounced sheers at the forward and after ends. They are therefore difficult to stow with unitised cargo as the bilge area and the end holds present difficult shapes. Benching may be required to 'square off' these areas for forest products. However these vessels are economic to run, have a large intake and low unit costs.

5.3 Open-hatch forest product carriers

These vessels are also multi-purpose but may be described as 'forest product friendly'. They are designed with box-shaped holds and large hatch openings (without overhang) and hence the term 'open hatch'. Some are semi-open, which implies a small overhang. The advantage is that cargo may be loaded and discharged direct to or from its final stowage position, hence avoiding double handling. In addition they usually have double hull construction, which gives the hold a clean rectangular interior, unobstructed by side tanks, frames, sheers, stools, shedder plates etc. In many cases the holds are fitted with de-humidifiers and/or forced ventilation to ensure good cargo care on passage.

Fig. 15

Open hatch bulkhead with corrugations.

5.3.1 Fully open vessels are frequently fitted with gantry cranes to maximise deck space and efficiency. They are often self-sustaining and carry their own gear such as lifting frames and vacuum clamps. They can load and discharge cargo in a 'systematic' way compatible with the shore equipment. Some of these vessels are fitted with rain protection over the cranes. Typically the cranes lift about 30 tonnes but some new designs go up to 60 tonnes.

5.3.2 Fully open vessels are highly suitable for all kinds of forest products and carry large amounts of pulp, paper, and timber products worldwide.

5.3.3 Semi-open vessels are usually equipped with slewing cranes. The usual position of the cranes between the hatches means that there is a small overhang fore and aft, but the holds are usually parallel sided with little or no

longitudinal overhang. Semi-open vessels offer the ship-owner a slightly cheaper option. With careful operation and stowage planning they can be operated to good effect in the forest products industry.

Fig 16

Open hatch box shaped forest products gantry vessel

5.4 STO/RO vessels

5.4.1 STO/RO vessels are widely used in the carriage of forest products, especially on short sea routes, and are particularly favoured by integrated paper producers. The vessels may vary in size from a few thousand tonnes deadweight to fifty or more thousand tonnes on deep-sea routes. Cargo may be stowed as break-bulk (previously described) or systemised in some way. It is common to load cargo direct to trailers, such as Mafi trailers, and then load the trailer together with the cargo. This obviates the need to stow the cargo as individual pieces, and enables the trailer and cargo to be discharged together. In this way the cargo is not handled at all in the vessel and hence time is saved and quality is assured. It has the disadvantage that

5.4.2 there is a large investment in trailers, which have to be returned (usually empty) to the place of origin. A variation on this theme is the use of cassettes, which are low platforms on which the cargo is loaded. The cassettes are lifted and moved by low profile, multi-wheel translifters, which are mobile units that are designed for the purpose. These methods tend to be used on dedicated routes.

5.4.3 Some integrated paper producers have their own specialised handling arrangements such as ‘jumbo’ containers. The handling principles are the same as above, ie a quick turn-round with no cargo handling onboard. Such containers may weigh up to 80 tonnes each.

5.5 Container vessels

5.5.1 Container lines carry large amounts of forest products. Containers offer a quick and easy method of shipping cargo from door-to-door without directly handling the product either in port or in the vessel. The cargo is stuffed at the place of origin and unstuffed at the final destination. However containers are not suitable for all types of forest products, partly on economic grounds and partly for physical reasons. Some products are simply too large or awkward to fit into a container. However significant amounts of finished product such as, printing paper, copy paper, tissue, machined wood products (broom sticks, tool handles etc), newsprint, some pulp products and waste paper are very compatible with container shipment.

5.5.2 When shipping by container the shipper plays a part in the operation by stuffing the container. It is important that this is done correctly. Some products are quite dense and care should be taken not to overload the container either in total or in relation to what the container floor can stand per square metre. Containers should be packed uniformly with no more than 60 percent of the weight of the load in one half of the container. The cargo should also be secured within the container, either by chocking, lashing or air bagging prior to shipment.

5.5.3 Some containers are delivered direct to consignee and others are unstuffed at conventional forest product terminals and the material is warehoused until delivery is required.

5.6 Side loading vessels

5.6.1 Side loaders are specialised vessels usually designed for the carriage of newsprint. They are totally enclosed and have one or more openings on one side of the vessel where a lift takes reels from inside the ship and brings them to a convenient level adjacent to the dock. From there clamp trucks run the reels to the warehouse.

5.6.2 Inside the ship, other clamp trucks (usually part of the ship's equipment) are employed to place the reels onto the lift. The work in the ship is much the same as conventional STO-Ro handling.

5.6.3 These types of vessel are usually run on dedicated routes, and frequently owned by integrated producers.

5.7 Woodchip carriers

5.7.1 In sheltered waters woodchips are usually moved by barge, but deep-sea shipments are transported in specialised woodchip vessels. Essentially they are large bulk carriers. Because woodchips are light in relation to volume, these vessels are constructed for maximum intake by volume. Blowers, elevators or grabs handle the cargo mechanically

6 MISCELLANEOUS

6.1 The hazards of working in lighters

6.1.1 In certain parts of the world, notably South East Asia, mid-stream operations form an important part of the forest products trade. Cargo is transferred between sea-going vessels, lighters and/or coastal vessels at buoys and anchorages. (Some ports have insufficient draft for larger vessels to berth alongside).

Fig 17

Lighter operation.

6.1.2 The risks to personnel working in lighters are relatively high due to the following reasons:

- Cramped working space
- Insufficient room for workers to stand well clear of cargo being lowered
- Unsafe working practices
- The rolling motion of both ship and lighter
- Unpredictable swinging of cargo
- Signalmen sitting or walking along hatch coamings
- Cargo being lifted over people's heads
- No safe means of access to the lighters
- Poor or non-existent lighting in barges
- Little or no safety training or safety equipment provided.
- Over-long working hours

6.1.3 There is no immediate or easy solution to solve the safety issues associated with mid-stream working. Many of the problems are inherent in the way the industry is run. It is a successful method because it is a low cost method and

this in turn has resulted in low levels of investment and training. It operates in areas subject to weather and sea conditions that bring increased hazards.

6.1.4 Therefore vessels working forest products from or into lighters should do their utmost to ensure maximum attention to the safety of those working in the barges.

6.1.5 Wood pulp is sometimes loaded to ocean going vessels from large flat-topped barges. To avoid wet damage, the pulp should be stowed on double dunnage to facilitate drainage, and then well covered by tarpaulins.

6.2 Hold atmosphere and ventilation

6.2.1 A clear understanding of the causes and remedies of condensation is essential to the carriage of forest products. Condensation occurs when warm, moist air comes into contact with a cold surface. The cold surface may be the steelwork of the ship as it proceeds through differing climatic zones, or the surface of the cargo, perhaps loaded in sub-zero temperatures. Either way condensation can occur and cause damage to sensitive cargo.

6.2.2 Condensation occurs when a given air mass reaches the temperature at which it is completely saturated. This is the dew point. The relative humidity at this moment is one hundred percent and the air can hold no more moisture at this temperature. Therefore to avoid condensation it is necessary to lower the dew point and/or lower the relative humidity of the air in the hold. (Temperature, dew point and relative humidity are all linked. If two values are known, the third can be calculated).

6.2.3 Lowering the dew point can be done in a number of ways, but if ventilating, the rule is this.

- If the dew point temperature of the outside air is less than the dew point in the hold – ventilate.
  In this way the dew point of the air in the hold is reduced and condensation is avoided.
- If this is not the case, then – do not ventilate. (Because more and more moist air would be drawn through the hold, condensing out large amounts of water).

6.2.4 From a practical point of view, ventilation can only be done if the vessel is well fitted with natural or forced ventilation, and the dew point is known. The dew point of a hold can be obtained manually by a ‘wet and dry bulb’ hygrometer. This is a reliable and simple method but is rather time-consuming and presupposes that there is easy access to the holds. However it only gives the dew point at the moment of reading and ignores the fact that the vessel may pass through warm or cold air masses between readings. Other possible solutions include:

6.2.5 Using a system of electronic sensors in the holds to give a continuous, accurate, read-out of the temperature, relative humidity and dew point.

6.2.6 Fitting de-humidifiers

These days many ships are fitted with de-humidifiers. Air from the hold is drawn through the de-humidifiers and moisture is removed, usually by a desiccant system. This reduces the relative humidity, and hence the dew

point. Logically if all moisture is removed from the air, there is no moisture to condense out.

6.2.7 Frequent cargo inspections are recommended and records of dew points and temperatures should be maintained onboard. In any case, it is good practice to cover the top of forest product cargo with kraft paper to catch any drips that may come from the underside of the hatch cover or deck.

6.3 Lifting slings

6.3.1 When working cargo, especially into Lift-on/lift-off vessels, careful attention to the safe use of the lifting slings is essential.

6.3.2 Cargo is usually lifted by means of slings that are made from wire, fibre rope or textile webbing. All slings should be in good condition and certificated for use. The safe working load must be known. The safe working load required may vary according to the legislation of the countries in which they are to be used, and the type of use – such as 'one way' or 'multiple' use. For example typical safety factors in Europe can be 7:1 (i.e. one seventh of the breaking load). In addition, the mode of lifting affects the safe working load, eg straight pull, or basket lift.

6.3.3 In general, with forest products, textile slings are preferable to wire or rope slings because they are softer, spread the load over a wider area and exert less pressure at the point of contact. Hence they are better in terms of cargo care, and are relatively durable and resistant to degradation.

6.3.4 Slings should always be inspected for cuts, abrasion or other damage by a competent person prior to re-use.

6.3.5 When using textile slings the following points should be remembered:

- Slings should be protected from friction, hot surfaces, sharp edges, chemicals, oil and grease
- Do not knot or hitch slings.
- Ensure loads are level and the weight is evenly distributed between slings.
- Do not overload slings
- Do not attempt to repair slings
- Avoid shock loads
- Do not allow slings to be trapped under cargo as the resultant crushing and subsequent 'pulling out' can damage the sling
- Ensure lifting hooks are smooth and of sufficient size not to damage the slings.

6.3.6 Always refer to the manufacturer's advice regarding the mode of lift and the safe working load of each method, for instance straight pull, basket lift, choke hitch etc.

6.3.7 For further information on the subject of slings refer to the Safety Briefing Pamphlet #16 "Safe Use of Textile Slings"

6.4 Air bags

6.4.1 Air bags play an integral part in the securing of forest products both in containers and in all types of vessels. They are available in a wide range of sizes and materials from rubber to paper. Some are designed for single use, but others are much more durable and last for many years.

Fig 18

Rubber Airbags in pulp stow connected to a manifold unit

6.4.2 A great deal of cargo damage can be avoided by the correct and efficient use of air bags. One of the problems is that the air pressure may decline during a long voyage with the air bags becoming less effective over time. Hence they should be checked periodically and if necessary re-inflated during passage. This can be done individually or by means of a remote 'manifold' system that automatically maintains the pressure of groups of air bags at all times.

Fig. 19

A typical 20 outlet Manifold unit

6.4.3 Air bags should be tested periodically, and repaired if necessary using an appropriate method.

Annexe

List of references

IMO Code of safe practice for ships carrying timber deck cargoes
IMO Code of safe practice for cargo stowage and securing
Drewry report “Forest Products Shipping”
ILO Convention 152
ICHCA Safety Briefing Pamphlet #1 ILO Convention 152
ICHCA Safety Briefing Pamphlet #10 “Safe working at Ro-Ro terminals”
ICHCA Safety Briefing Pamphlet #16 “Safe use of Textile Slings”

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