

Wire Rod in Coils (WRIC)



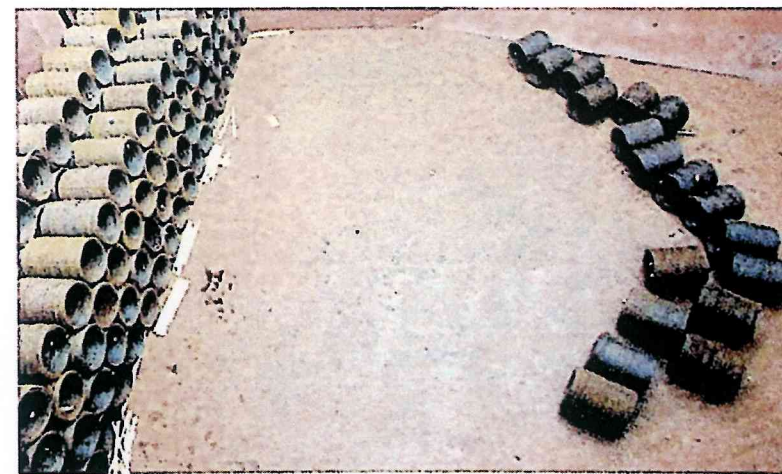
✓ Slings the coils for loading. One nylon belt per coil is used to avoid damage to the cargo



✓ By using lifting strops attached to beams (spreader), up to six coils at a time may be loaded in this layout



✗ In this set-up, eight coils are loaded. However, the slings are made of wire. This is not recommended as it may damage the coils or their securing straps/wires



✗ Poor loading practice. Coils landed directly onto a tank-top covered with previous cargo residues. The cargo residues may react with the steel

Wire Rod in Coils (WRIC)



six coils at a time



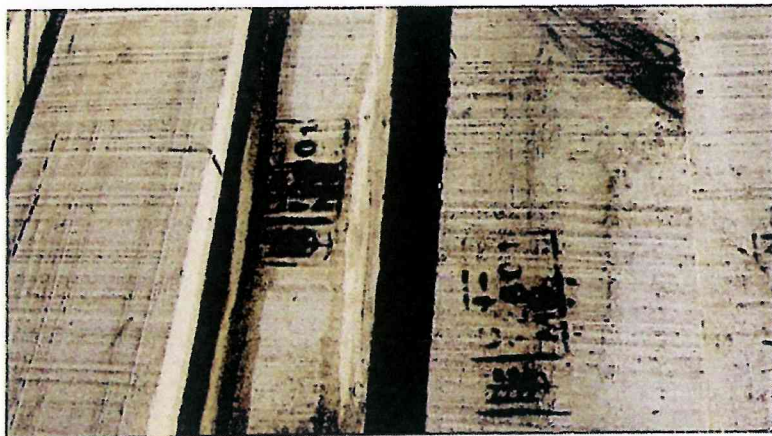
covered with the steel



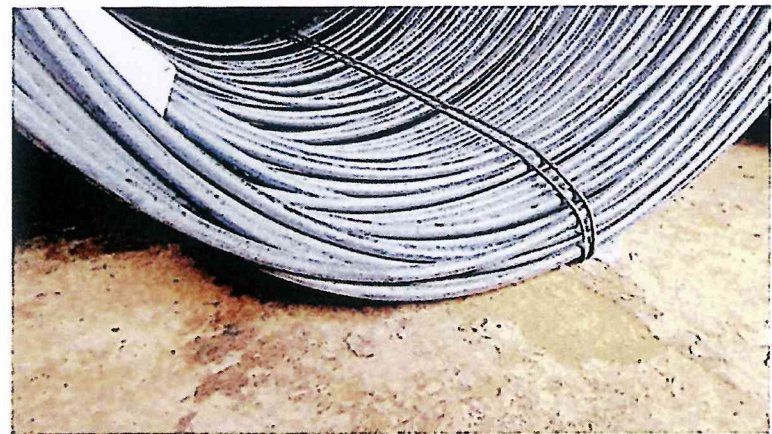
✘ The coils are landed in the hatch square before being positioned in the under-deck areas by forklift truck. The WRIC are loose and will collapse when stowed in tiers



✘ Timber dunnage is positioned on the tank-top. Plywood dunnage sheets are required

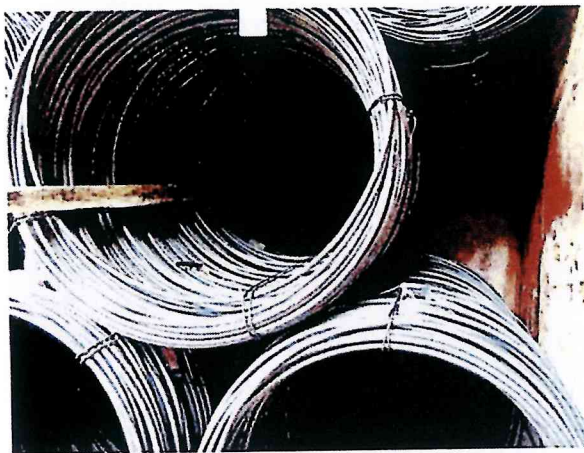


✔ Plank-type, timber dunnage for WRIC. 15 x 100 mm cross-section is a typical size. The dunnage in the photograph bears the ISPM 15 stamp. This dunnage is to be used for the bulkheads only, and not the tank-top

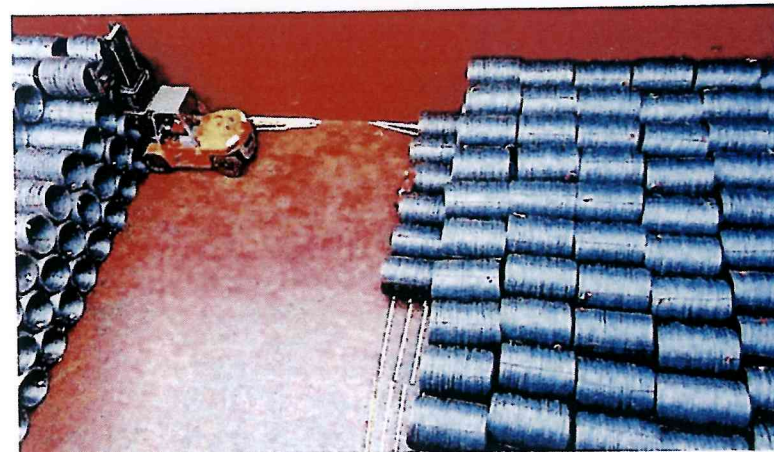


✘ No plywood dunnage under the coils. The bottom of the coil is in direct contact with the tank-top. Any moisture collecting on the tank-top will directly affect the coils

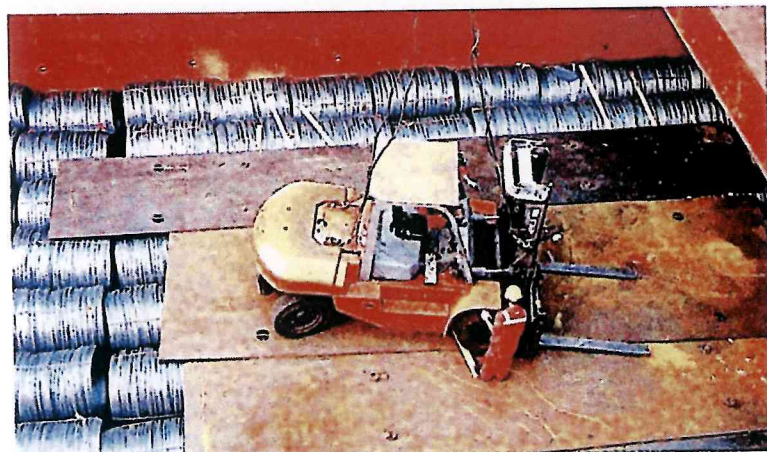
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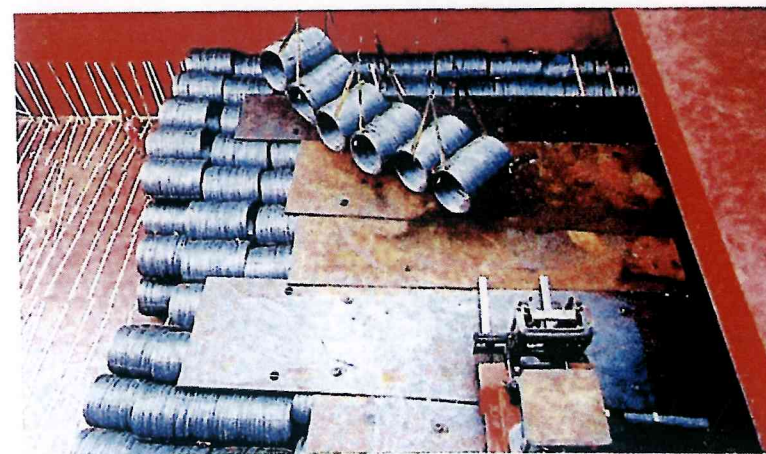
✘ No timber dunnage between the coils and the cargo hold bulkhead. Only four bundling wires in use instead of five



✔ After the under-coaming areas are stowed, the coils are loaded into the hatch square and forklift trucks are used to ensure that the coils are tightly stowed across the hold. No plywood dunnage has been used

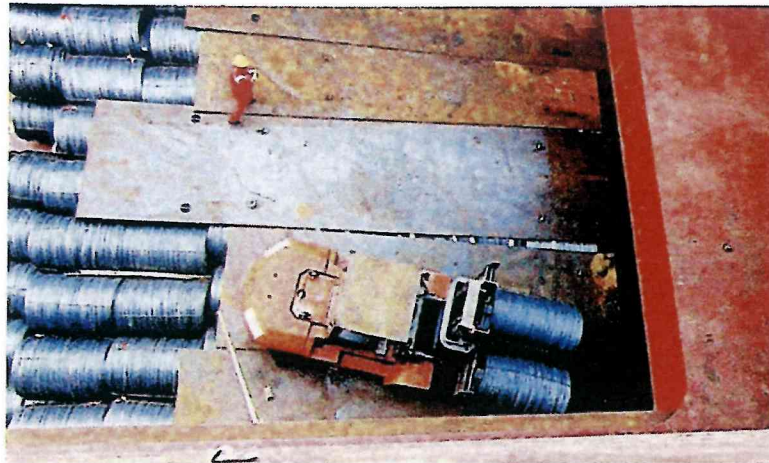


✔ Steel plates are used on top of the lower tiers to enable a forklift truck to stow the upper tiers under the coaming area



✔ The coils are landed on the steel plate ...

Wire Rod in Coils (WRIC)



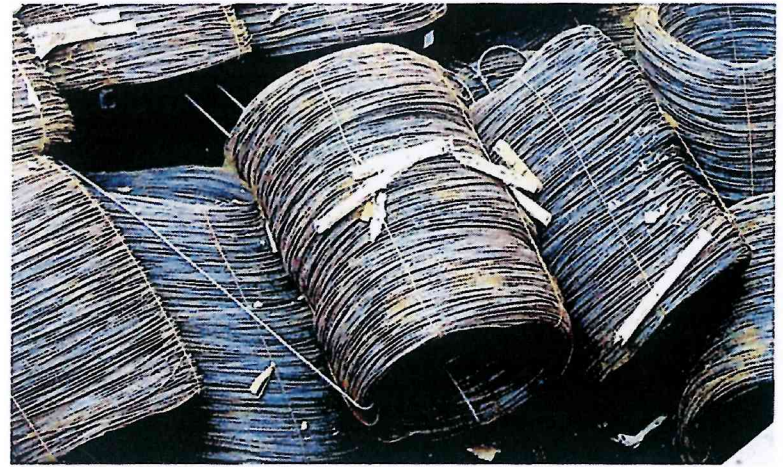
✓ ... and positioned under the deck area



✗ Near completion, the coils are stowed directly into position. This often leads to poor storage. The above shows a row of coils that has partially collapsed



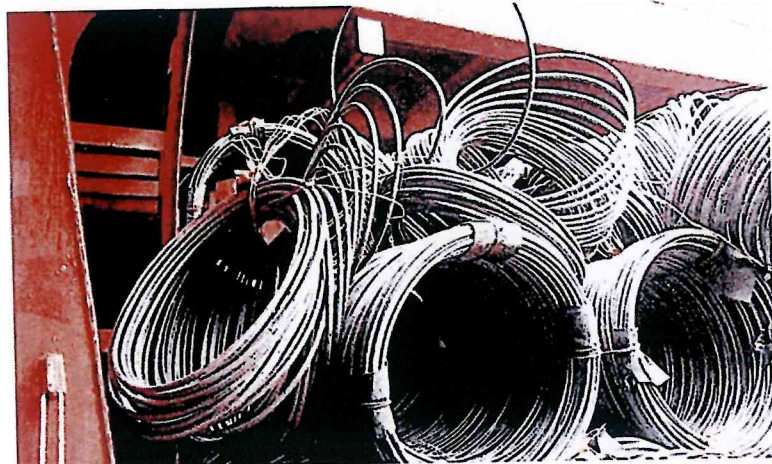
✗ These coils have been randomly stowed and will be time-consuming to discharge. Crew supervision is essential to stop this standard of loading



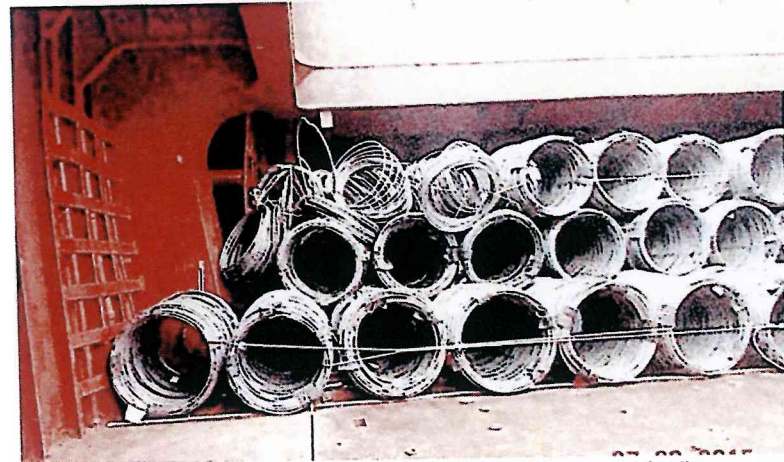
✗ Collapsed stow of WRIC

into the hatch
ightly stowed

Wire Rod in Coils (WRIC)



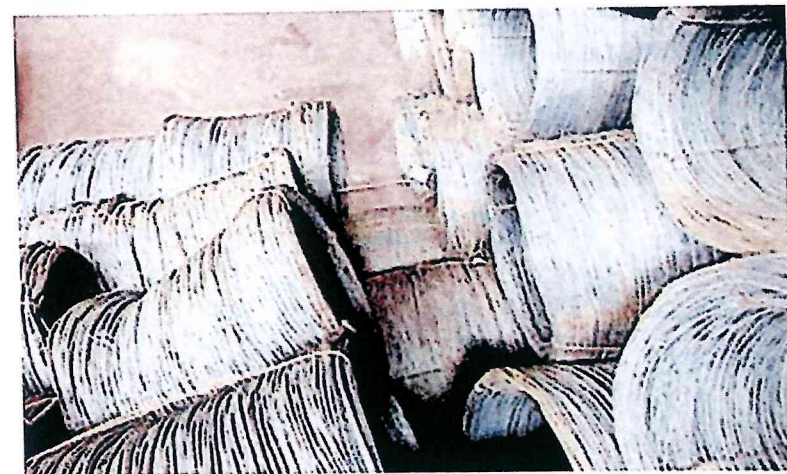
❌ Unwound and damaged coils. These should not have been loaded as they may be rejected by the receivers and will be difficult and dangerous to discharge



❌ The stow of coils is not tight across the hold due to the unwound coils

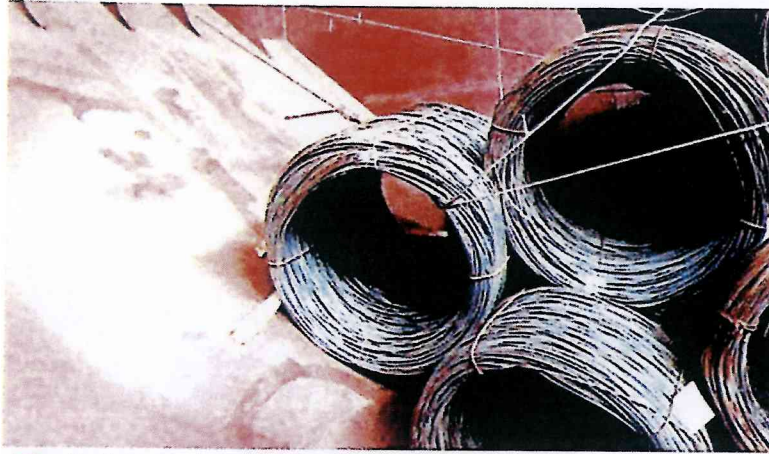


❌ One coil has fallen off the stow and is sitting vertically and unsecured

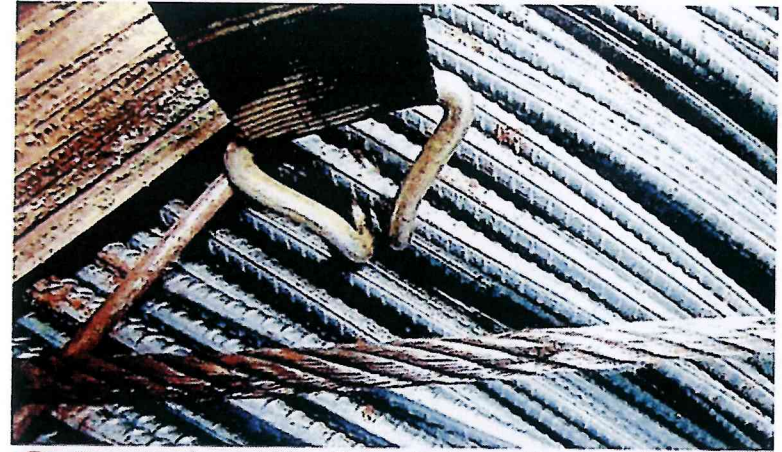


❌ Poorly stowed outer coils in a bulk carrier. Although the tiers are lashed, the outboard coils are leaning forward and will likely collapse on the voyage

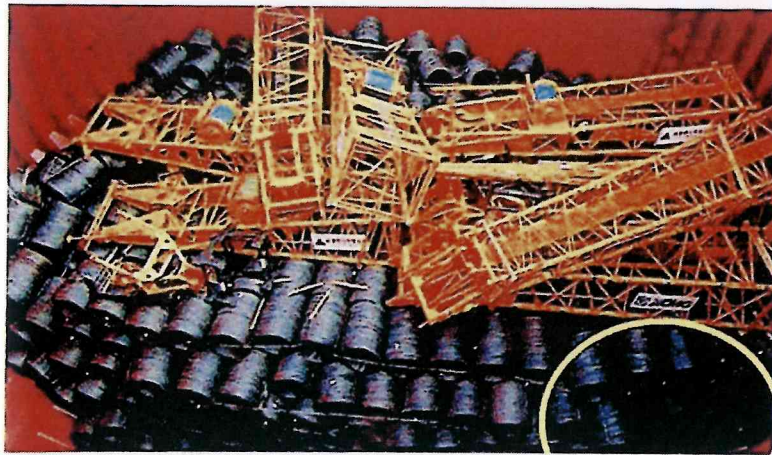
Wire Rod in Coils (WRIC)



❌ No timber dunnage between the sloping plate and the coils. Steel-to-steel contact means there is no friction to restrict the outer coil from moving forward



❌ Cargo stowed above WRIC, which must not be considered. In addition, the lashings for this cargo are attached directly to the wire rod. The hook will either fall out or deform the wire rod, resulting in loose lashings

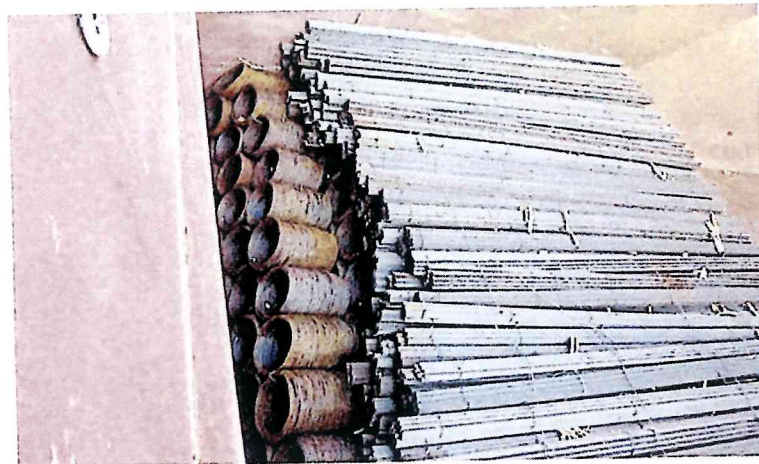


❌ Cargo stowed above a high, loose, stow of WRIC. The face of the stow is in imminent danger of collapse. The cargo on top will fall onto the steel coils below



❌ Heavy crane counterweights and blocks stowed at the front edge of a high stow

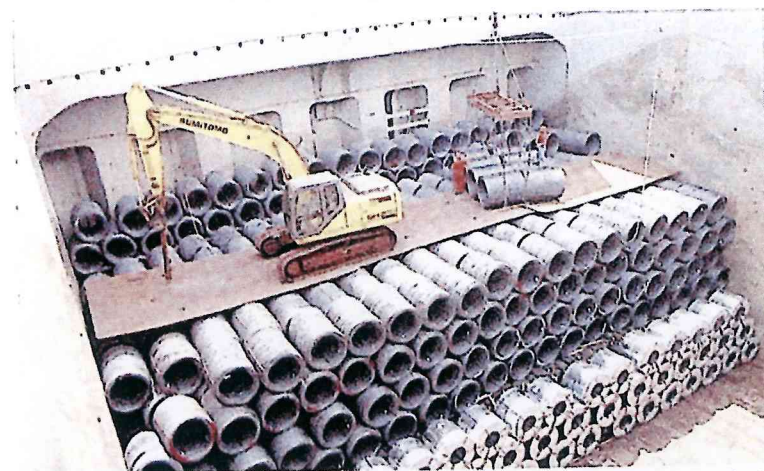
Wire Rod in Coils (WRIC)



✘ Lengths of structural steel stowed on top of coils. The WRIC stow collapsed and had to be discharged. Many of the coils were damaged



✘ Collapsed stow and deformed coils due to loading cargo above the coils

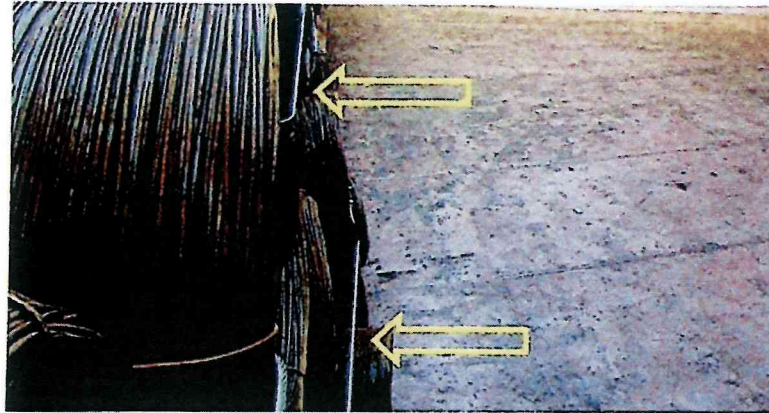


✔ Completing a stow in the aft part of the cargo hold. The forward-facing vertical wall will need to be lashed

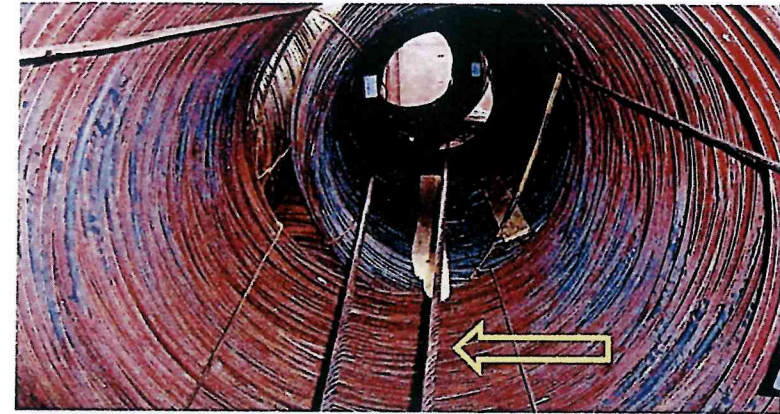


✘ Lashing the vertical face. Note the lack of safety harnesses. No safety access to the vertical part of the stow

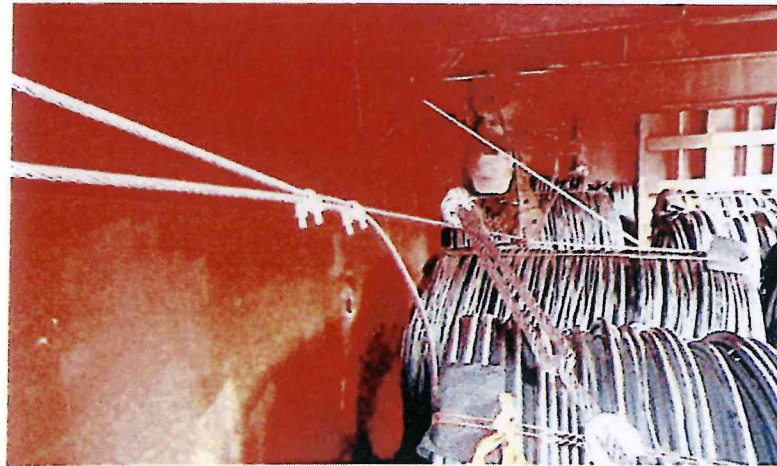
Wire Rod in Coils (WRIC)



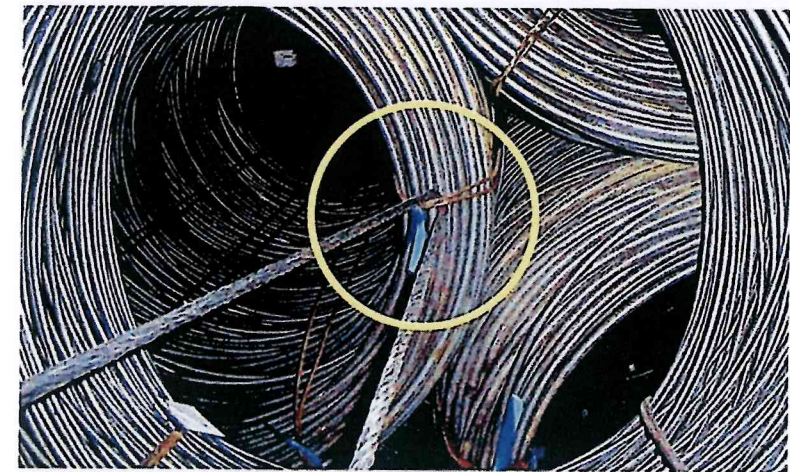
✓ Lashing wires are passed through the forward face of the coils



✓ The lashing wires are then passed through the coils towards the adjacent bulkhead

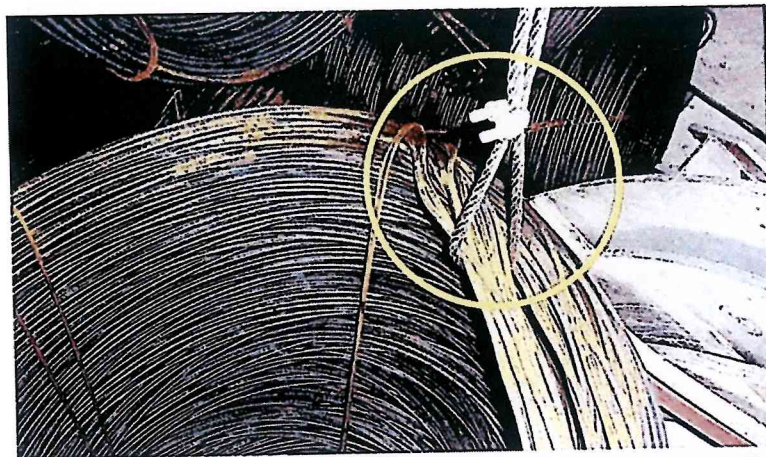


✓ The lashing wires are then secured to a designated lashing point inside the cargo compartment



✗ The lashing wires must not be secured to the bundling wires of WRIC further back in the stow

Wire Rod in Coils (WRIC)



X No part of a coil should be used for securing any other cargo. The wire rod will be pulled out, which will damage the cargo and result in loose and ineffective lashings



X Ports have experienced poorly stowed and secured WRIC. Here, the face of a vertical stow has partially collapsed. This is extremely dangerous for the stevedores when releasing the lashings



X This stow of coils has partially collapsed, with damaged and loose coils. Cargo in this condition is time-consuming and hazardous to discharge



✓ A compact stow across the cargo hold

Wire Rod in Coils (WRIC)



✘ An atwartships stow in the under-coaming space. While this type of stow makes discharging by forklift truck easier and quicker, it should be lashed individually



✘ Stows of WRIC and rebar that are too close together. No lashing on the WRIC. Rebar discharging is in progress and collapsing of the WRIC was observed during the discharging

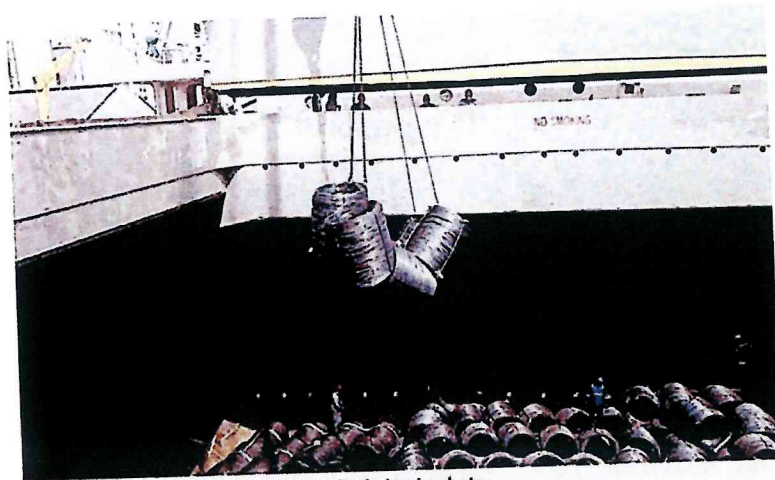


✘ Combined stow of rebar and WRIC. Collapse of the WRIC in the under-coaming spaces. Difficult and unsafe access for discharging



✘ Improper stow. Access to the lower tiers of the vertical face is hazardous

Wire Rod in Coils (WRIC)



✓ Six WRIC handled with two single leg baskets



✓ The coils will be discharged by a single leg basket through the WRIC. Four WRIC handled with two wire slings



✓ Two WRIC handled with two single leg baskets



✓ Jurong Port has a multi-fork side-loader for transportation of WRIC from the quay to the storage area

Wire Rod in Coils (WRIC)

Notes

- Plywood dunnage, of at least 10 mm thickness, should be used on the tank-top. Wooden planks of approximately 15 mm x 100 mm cross-section should be used for the bulkheads and, if required, between tiers.
- The height of the stow should not exceed the manufacturer's recommendations for the maximum number of tiers. If such recommendations are not provided, they should be requested. Without a manufacturer's recommendation for the maximum number of tiers, it would be considered reasonable for the tiers not to exceed ten in height, but this is also dependent on the ship's permissible tank-top loading limits.
- For part hold loading, the cargo should be loaded against the aft bulkhead.
- For the face of a part stow, as a minimum, the upper three tiers should be secured to the aft bulkhead.
- Lashing of the top three tiers is not required for a full stow of WRIC. It is, however, recommended.
- When the under-coaming WRIC are stowed athwartships, the top three tiers should be lashed in a group. This stow is not to be lashed to the open hatch stow. The open hatch stow may not be lashed if the stow is across the full length of the tank-top. It is good practice, however, for the top three tiers to be lashed in a group.
- The WRIC must not be overloaded with other cargoes.
- For partly stowed cargoes, front rows adjacent to the face are to be pre-slung. This will assist the discharging in the event of collapse of the stow in transit. (The number of tiers depends on the maximum height that a forklift truck can take them.)
- In the cargo compartments, where possible, safe passage should be provided directly from the ladders to the top of the cargo stow. In bulk carriers, this access should be provided directly from the Australian ladders. Safe access should also be provided from the tank-top to the top of the cargo stow.



WRIC. Four



WRIC from the

Steel Plate

General

Steel plate is thick, flat-rolled steel, produced from slab or ingot, that is supplied in various sizes and grades. Generally, the thickness can range from 5 mm to 80 mm. Sizes range from 2,000 mm × 1,000 mm up to 12,000 mm × 3,000 mm. Larger plates may be supplied to suit the end user's requirements. Loose steel plate is rarely bundled. However, smaller plates of similar dimensions may be bundled with steel strapping. Finished, cold rolled plates will likely be packaged for protection.



Packaged steel plate with protective wrapping and timber supports attached with steel strapping



Individual loose steel plates with no packaging or bundling

Steel Plate

Dunnage

Steel plates have a tendency to shift if not correctly dunnaged as there is very little friction between steel plates laid directly on top of each other. Steel plates are typically carried loose, although they may be strapped in bundles or packaged.

In accordance with industry best practice, good, dry, bark-free, hardwood dunnage should be used throughout as soft wood dunnage is too easily crushed or damaged. Rounded timber, timber with damaged or crushed corners, or non-square face dunnage must not be used.

Dunnage should be laid in rows on the tank-top in an athwartships direction under each row of plates. Only square one-layer dunnage should be used. Double-stacked, rectangular dunnage or a 1 on 2 stack dunnage arrangement must not be used. As a rule, the maximum distance between each row should not exceed 3 metres under each plate. However, sufficient rows should be

laid to fully support the plates. One international steel manufacturer requires a minimum of eight timbers to support a thin 12 metre long plate. Tank-top dunnage should be at least 100 mm x 100 mm, while 50 mm x 50 mm is the preferred cross-section to be utilised for all other tiers. Dunnage should be placed between individual tiers and chocks placed between plates/packages on every tier. Long plates are more susceptible to buckling/sagging if insufficient dunnage is used. The length of the dunnage should generally correspond to the width of the steel plate, but small-length dunnage may be used if properly aligned.

Dunnage should also be placed against the hopper, inner shell plating and bulkheads and the internal vertical frames in cargo ships. The higher or heavier the intended stow, the more dunnage should be used on the tank-top and in the lower tiers.

Dunnage between tiers must be arranged such that the rows of dunnage are vertically aligned. This might not be possible in way of the hopper tanks but must be adhered to wherever possible.



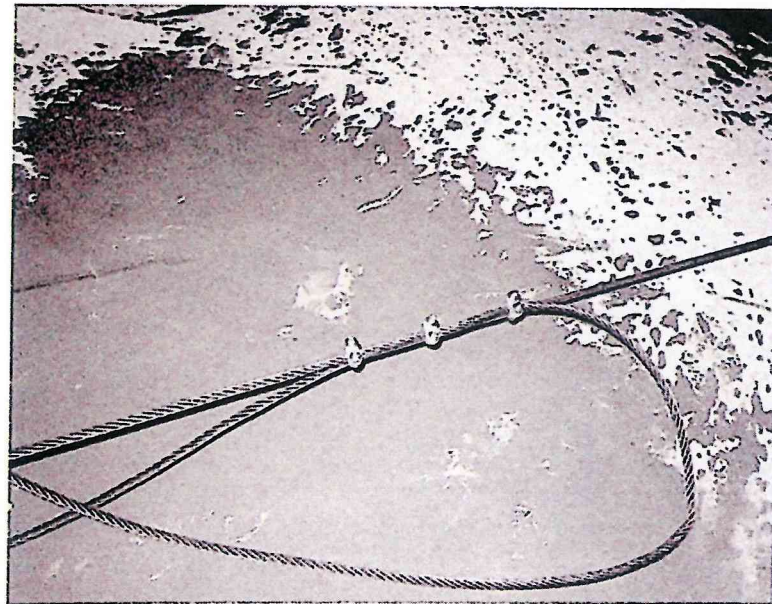
Steel Plate

Lashings

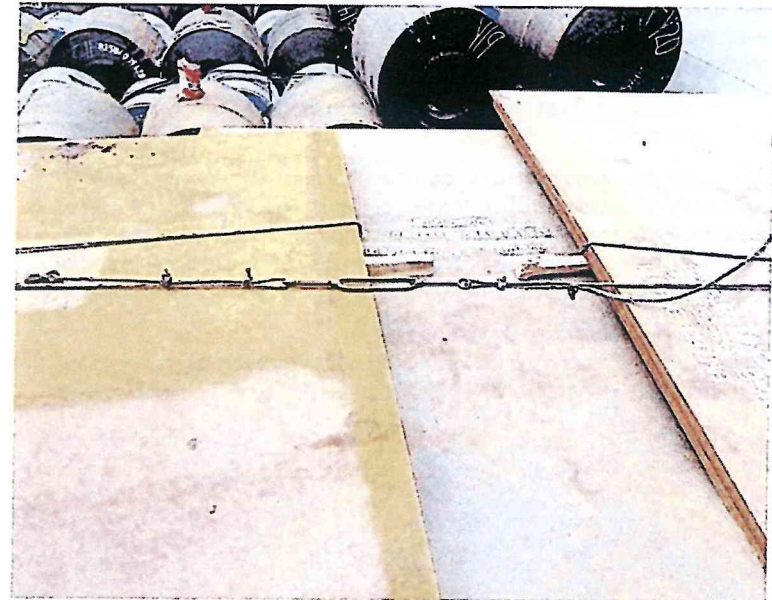
When the cargo is stowed across the full width of the cargo hold, the steel plate is prevented from shifting by the friction resistance of the timber dunnage used in the stow and the additional timber dunnage used to block the top tier. Wire or chain lashings are used to secure the stow in a single block and prevent the initial movement of the steel plates. All lashings must be tight and well made. The Master should be supplied with certificates for all the lashing equipment used.

An appropriate number of lashing wires or chains should be laid in an athwartships direction on the tank-top in preparation for being passed

back over the stow to secure the cargo in one block. There are no specific requirements for the minimum number of wires or chains to be used, although a minimum of two per row would be considered reasonable. Intermediate lashings can be applied to longer plates to bundle the steel together to create a tighter block stow. Timber or manufactured plate edge protectors should be used to protect the plate from damage and reduce the likelihood of the wires chafing.



X Incorrect use of bulldog grips. The saddle should be on the live wire



X Insufficient number of grips used and the saddle is not on the live wire

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Steel Plate

Stowage

It is usual to stow loose plates with the longest axis aligned in a fore-and-aft direction, although it is acceptable to stow plates athwartships in the middle of the stow. Bundled plate or packaged plate may be stowed athwartships for tighter and more efficient stow, as well as to suit the loading requirements. The plates/packages should be loaded over the slope of the hoppers on bulk carriers and not stowed as a California block.

Steel is a heavy cargo and the cargo hold tank-top loading limits must be considered when loading. The maximum height of the stow will depend on the allowable tank-top load limit determined by the shipyard and confirmed by the Classification Society when the ship was built. It should be remembered that this limit was calculated when the ship was new. For older ships, with normal wear and tear on the tank-top plating and associated under-deck stiffening, it is prudent to allow a safety margin.

The stow should be kept level throughout, with timber dunnage used to fill any gaps in the stow.

Any timber structures built to support the stow must be free-standing and sufficiently robust to survive the rigours of the voyage. If the structures collapse, the integrity of the stow will be compromised and plates/packages will inevitably move. This will likely cause serious damage to the ship and/or impair its stability and would inevitably lead to serious issues for the discharge operations.

All gaps in the top tier of plates should be chocked with timber dunnage to provide a secure, tight and level stow across the full width of the cargo hold.

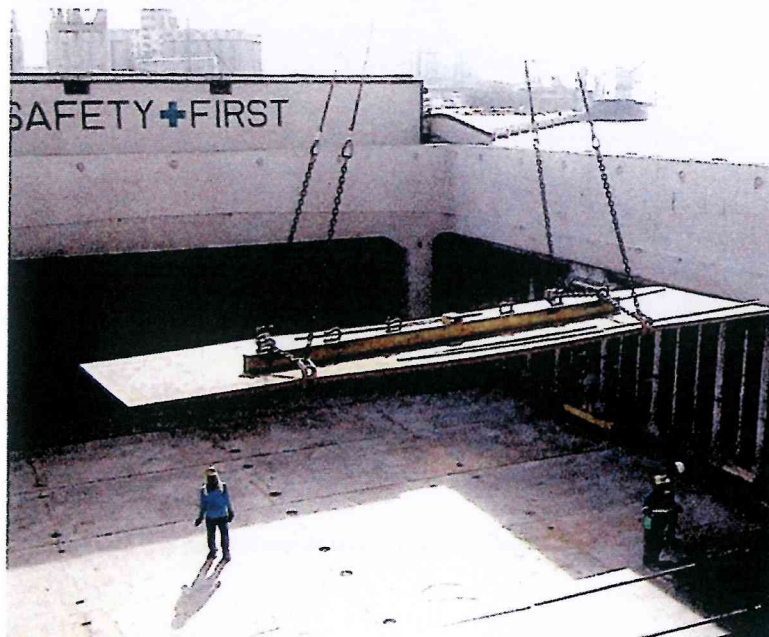


A level top stow of loose steel plates. Timber dunnage is used to secure the top plates, though this is not yet completed

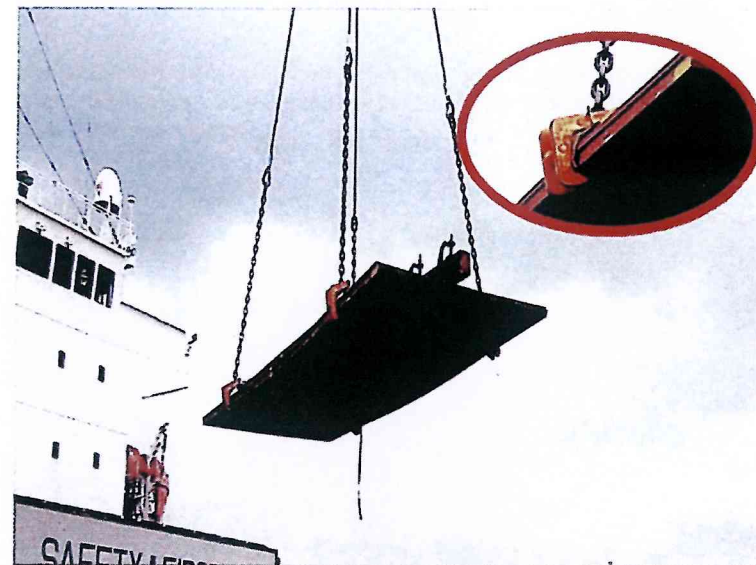
Steel Plate

Ports use 'C' hooks to discharge steel plates, four hooks per lift. The jaw opening of the hooks is 125 mm. The maximum permitted combined plate thickness (or a bundle) that can be lifted with these hooks is 110 mm. No single tier of loose plates should exceed this height.

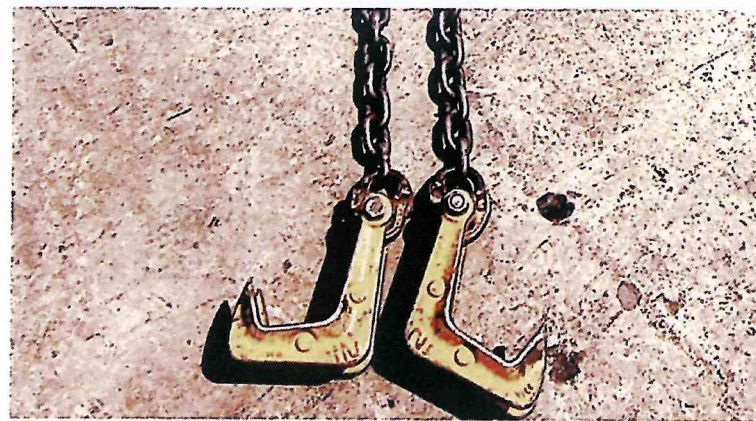
The typical weight calculation for a steel plate with dimensions 9.145 m x 2.438 mm x 0.011 m is approximately 1.86 tonnes (given a stowage factor of 7.6 tonnes per m³). The SWL of each hook is 5 tonnes, and to allow for a sufficient safety margin, the maximum weight for each lift is 18 tonnes. Therefore, for standard steel plates, the maximum number of plates to be lifted at one time would be seven.



'C' hooks and a spreader used for the discharging of steel plates



'C' hooks used for discharging

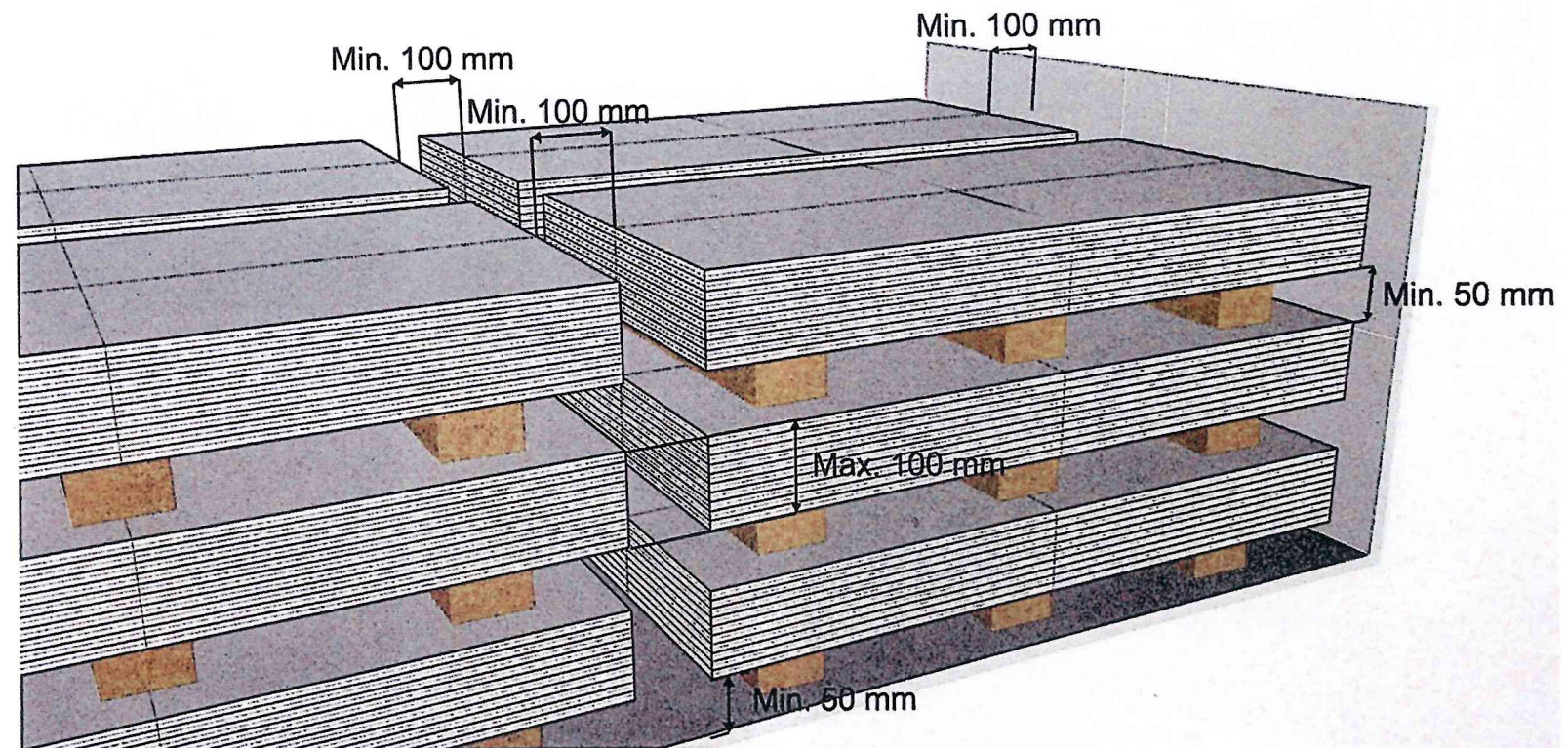


Close-up of 'C' hooks

to secure the top

ing of Steel Cargoes

Steel Plate



To allow the stevedores to correctly position the hooks, a minimum distance of 100 mm clearance must be left around the steel plates and at least 50 mm between tiers. The thickness of the bundle or the number of plates stowed in one tier should not exceed 100 mm.

Note: For illustration purposes, the vertical dunnage between the bundles is not shown in the schematics.

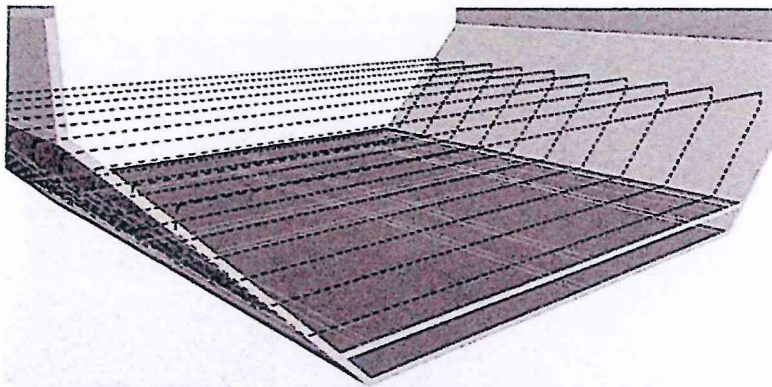
Steel Plate

Schematics for Correct Lashing and Dunnaging

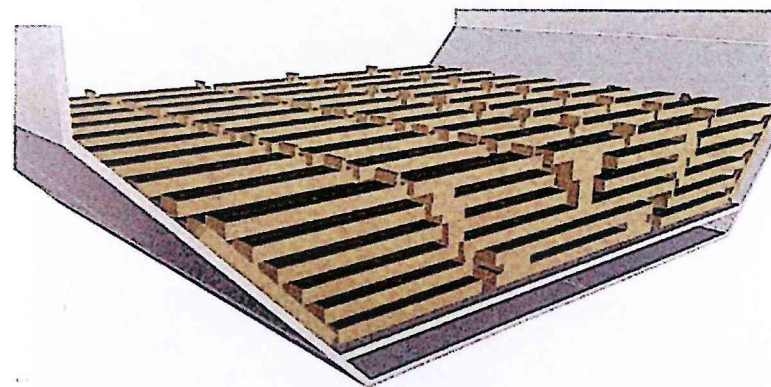
All schematics are indicative.

Tank-top dunnage should be hardwood of at least 100 mm x 100 mm, while 50 mm x 50 mm is the preferred dimension for all other tiers.

A minimum of 2 wires positioned on the tank-top and passed athwartships per 6 metre length or a minimum of 3 per 9 metre length of steel plates would be considered reasonable.



Lashing of the steel plates stow starting from the tank-top. The wire spacing should be approximately 3 metres



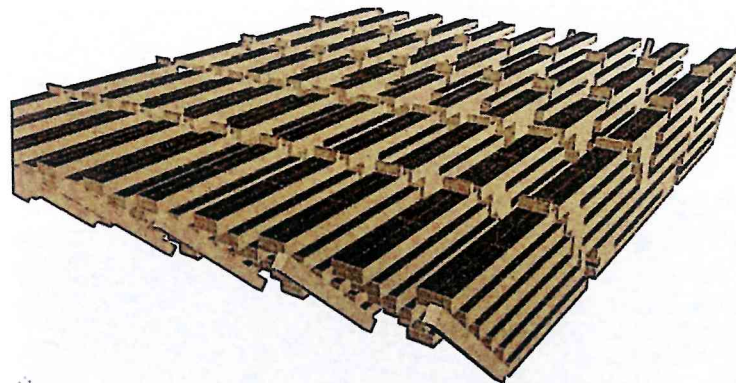
Hardwood dunnage of the steel plates stow. The spacing of the dunnage should not exceed 3 metres

Min. 50 mm

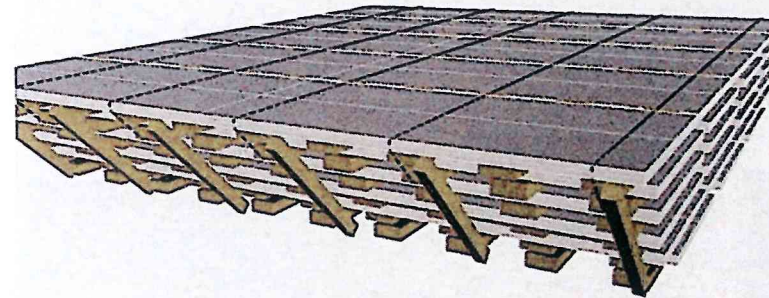
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uring of Steel Cargoes

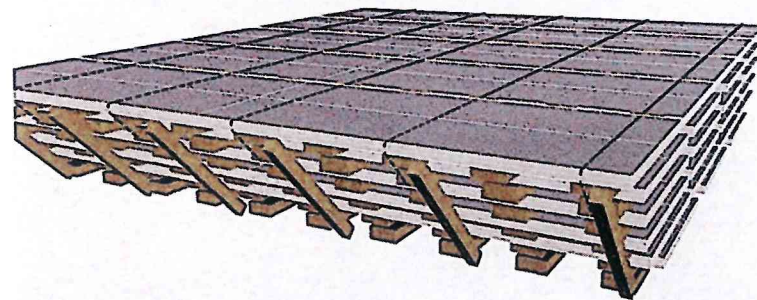
Steel Plate



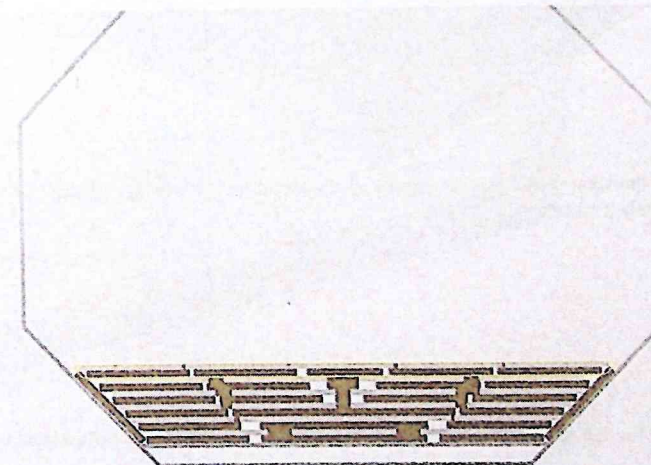
The dunnage should be spaced approximately 3 metres apart



Steel plate stow with dunnage and top tier lashing



Steel plate stow with dunnage and top two tiers lashing

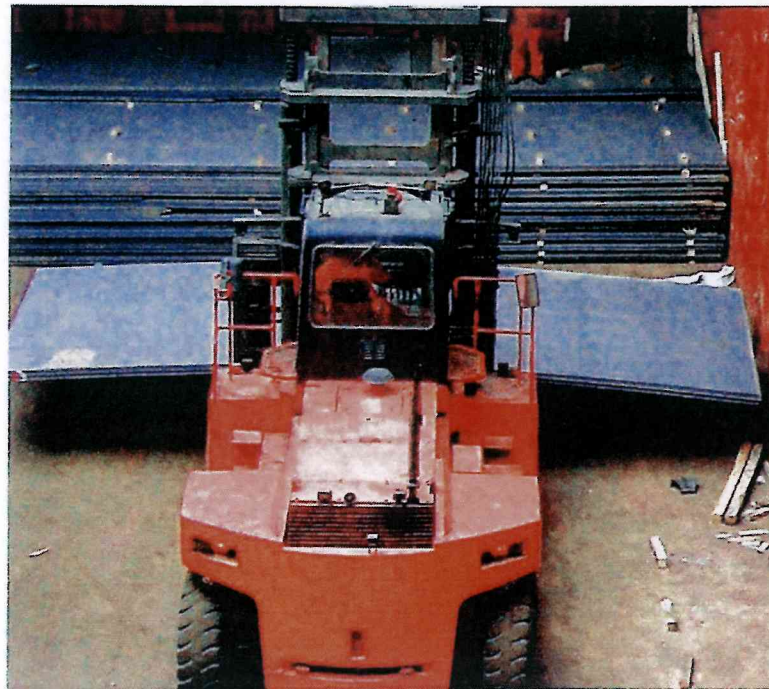


Steel plate stow with dunnage and top two tiers lashing

Steel Plate

Under-Coaming Stowage

All cargoes are discharged by vertical lift only. Ports do not normally use the lifting gear to drag cargo from the under-coaming spaces to the open hatch square as it overloads the lifting gear and equipment, which can lead to catastrophic failure. Forklift trucks are used to facilitate the discharging of such cargo.



Steel plate being lifted by a forklift truck

This requires that the steel plate in the centre of the cargo hold is level and the timber dunnage under the plate is sufficiently strong to withstand the movement of the forklift truck as it pulls the cargo clear from the wing space to be discharged.



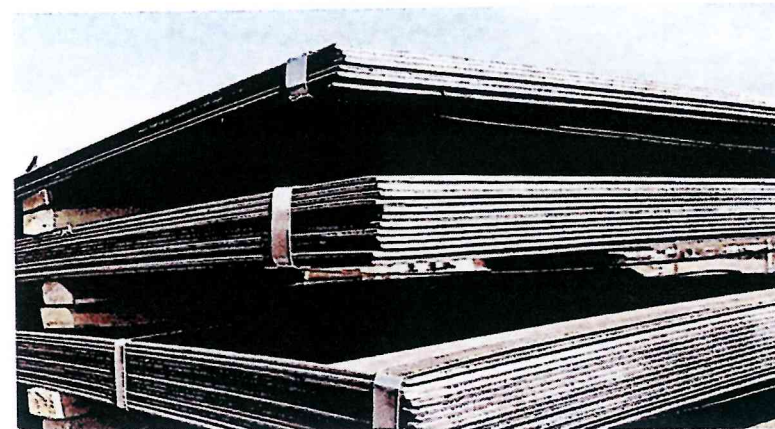
X Incorrect handling of steel plates under the coaming. If the lift is not plumb (vertical), the cargo will sway dangerously towards the centre of the hold

Steel Plate

Delivery of cargo at the jetty prior to loading.



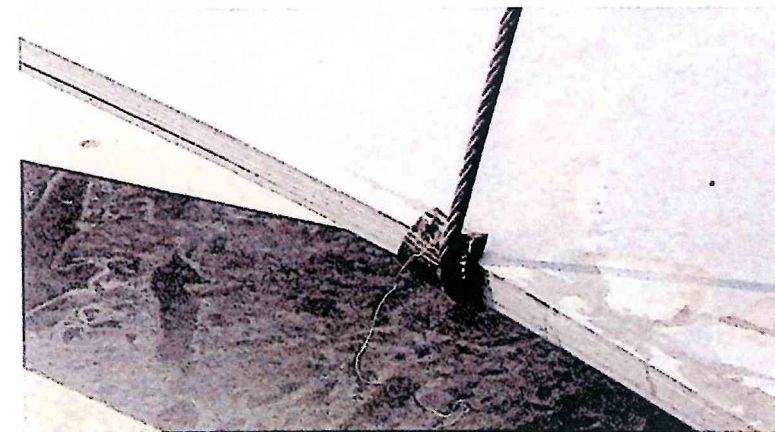
✔ Unbundled, long steel plates



✔ Bundled steel plates ready for shipment. Only bundles of 100 mm height are accepted for handling at ports. This applies only to bundles of more than 6 metres in length



✔ Unbundled, long steel plates loaded with a spreader

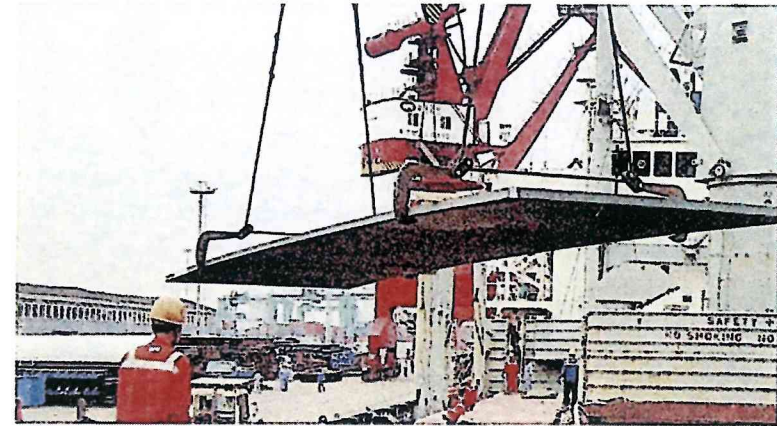


✔ It is recommended that suitable edge protection is used when wire slings are used for handling the cargo

Steel Plate

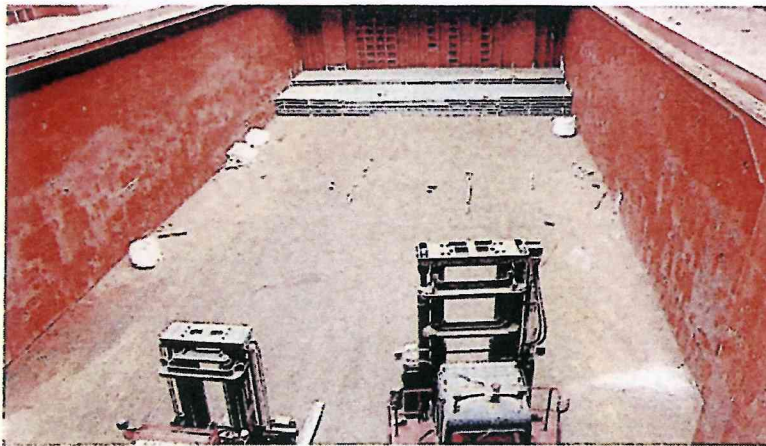


✓ Bundled, palletised, prefabricated steel plates

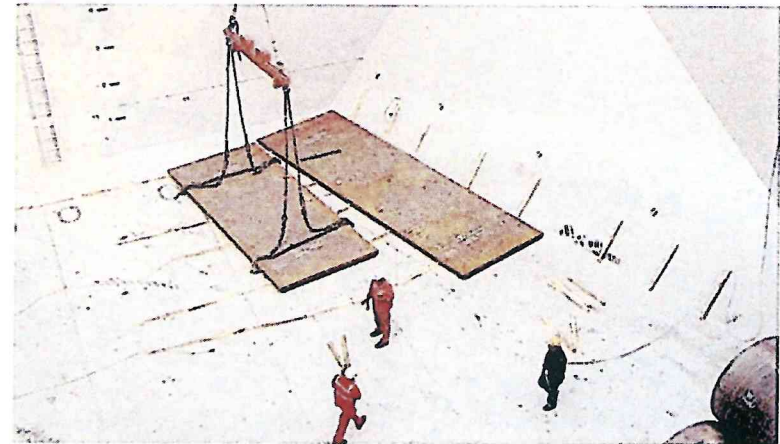


✓ Loading of steel plates with 'C' hooks

Holds must be swept clean and dry prior to the loading of steel plates.

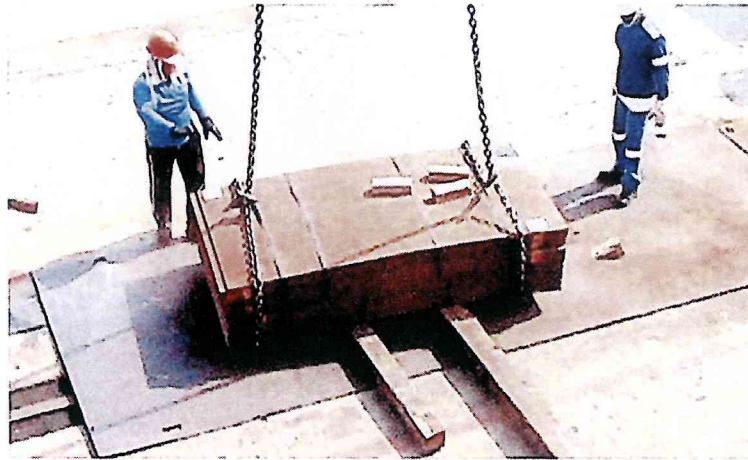


✓ General cargo ship with box-type cargo compartments. Lower hold and 'tween deck. Athwartships loading. Under-coaming loading



✓ Dry bulk carrier with hopper-type cargo holds. Dunnage should be used on the tank-top, side hopper tanks and bulkheads

Steel Plate



✓ Bundled steel plates ready for loading. Choke hitch chain sling in use



✗ Bundled steel plates. Broken steel straps. Incorrect choke hitch application



✓ Good storage and use of dunnage for steel plates



✓ Good application of dunnage for steel plates. It is acceptable to use short hardwood dunnage pieces instead of long bars

Steel Plate

The stow lashing should be prepared prior to the first tier being loaded.



✓ Lashing wires for securing of the final stow must be prepared on the tank-top prior to loading of the plates



✓ The horizontal dunnage on the tank-top and between the tiers must be vertically aligned

The stow block may be interlocked with alternate longitudinally and athwartships-oriented steel plates.



✓ Plates should be loaded longitudinally. The illustration shows the aftmost hopper-type cargo compartment of a bulk carrier

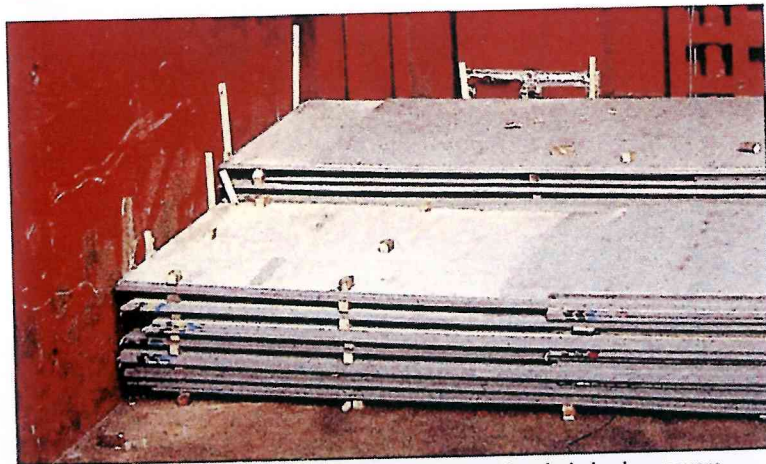


✓ The longitudinally-oriented plates may be locked in with athwartships-oriented plates for compactness of the stow

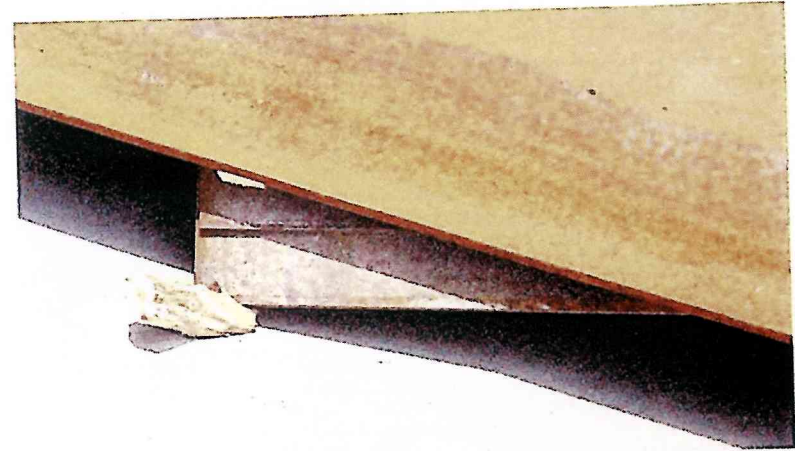
Steel Plate



✓ Dunnage must be placed between the stow and the bulkheads



✓ The dunnage between the tiers should generally be of whole piece square cross-section dunnage, although it is not unusual to use well-aligned small pieces of dunnage



✗ Incorrect use of dunnage



✗ A single chocking of the last two tiers must not be done this way. The dunnage in the photograph is not sufficient and may slip. The chocking should be along the length of the bulkhead

Steel Plate

Proper dunnage structure must be formed between the stow and the bulkheads. There must be vertical wood on the side of the bulkheads and stow.



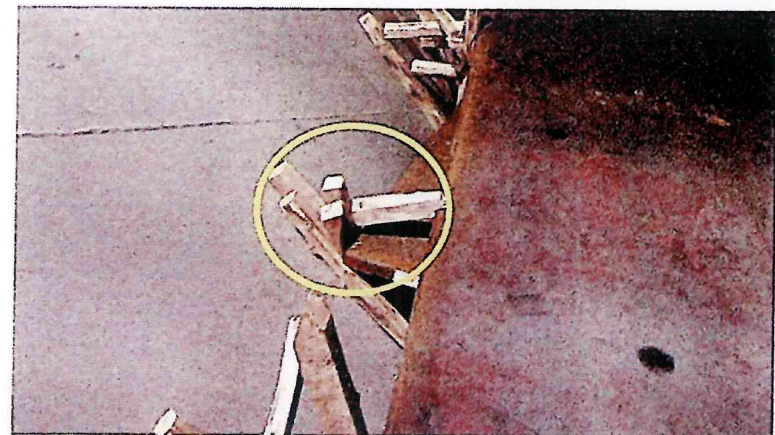
✘ Incorrect use and securing of dunnage. The wood may easily slip from the bulkhead and fall from its place during voyage



✘ Incorrect use of dunnage and lashing. There is no vertical dunnage on the side of the stow to support the horizontal wooden beams. No protector on the wire



✔ Good use of dunnage between the stow and the hopper-type bulkhead



✘ Poor use of dunnage between the stow and the hopper-type bulkhead. The dunnage contacting the plate edge should be flat

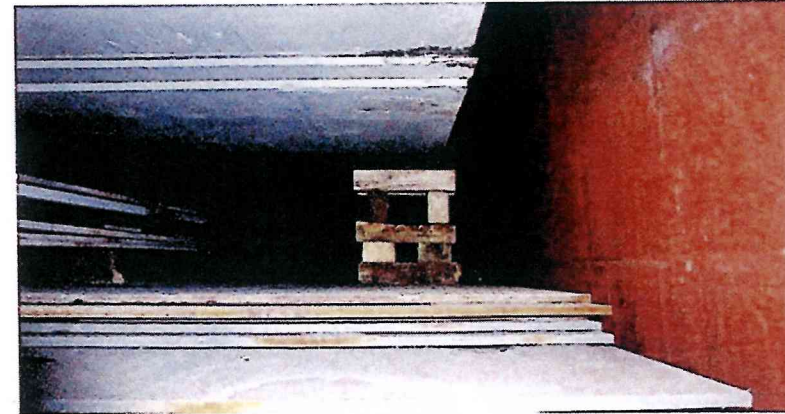
way. The dunnage
should be along

Steel Plate

Vertical alignment of the dunnage is important. Any loose ends of tiers should be properly supported underneath.

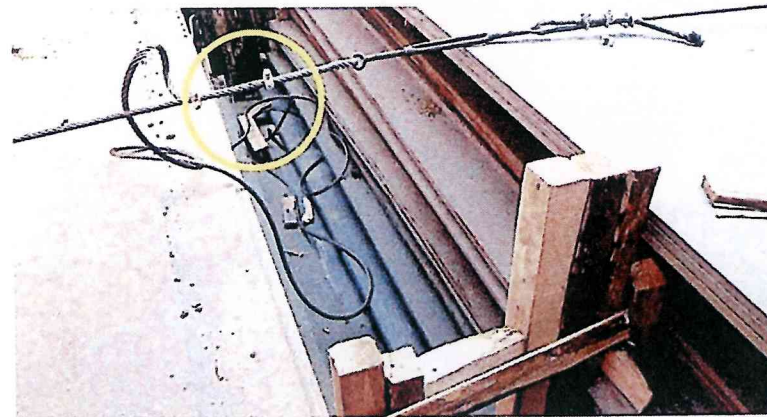


✘ Improper stow, alignment and use of dunnage



✘ Missing dunnage at the bulkhead. Incorrect use of dunnage to support tiers

Dunnage must be used for securing any gaps on the upper tier of plates. Strong, solid, horizontal, compact arrangements should be made.

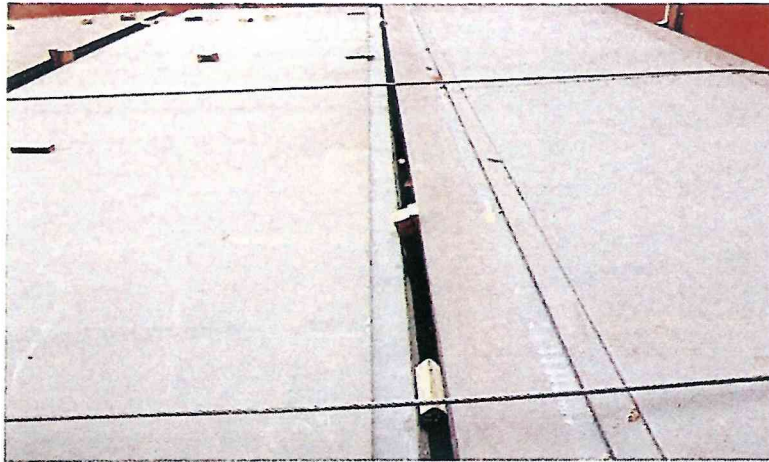


✘ While the dunnage has been used correctly, with additional horizontal securing, the number of bulldog grips is insufficient



✘ Incorrect use of dunnage. The pieces of wood are prone to collapse. Whole pieces of dunnage should have been used in several locations for chocking

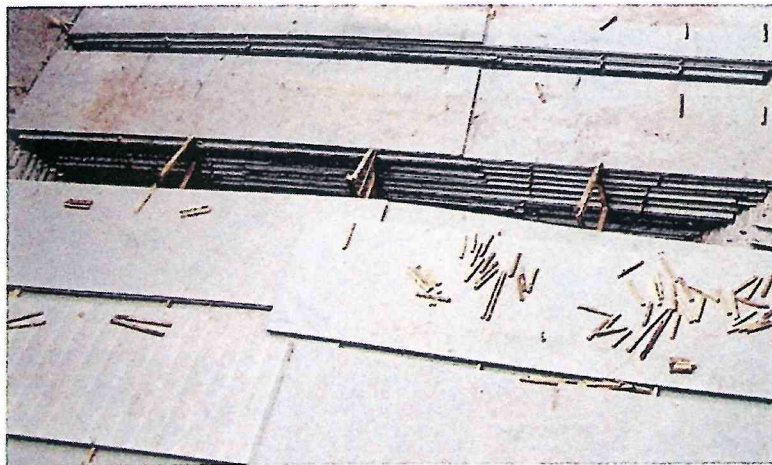
Steel Plate



✓ The stow must be secured. Generally, wire rope lashing is used



✗ The wire clips are insufficient and are also incorrectly placed. The saddle should be on the live wire and there should be a minimum of three grips



✓ Stow of steel plates loaded athwartships. Stow prior to the final lashing



✓ Stow of steel plates in longitudinal and athwartships direction. The upper tiers only are lashed with steel bands

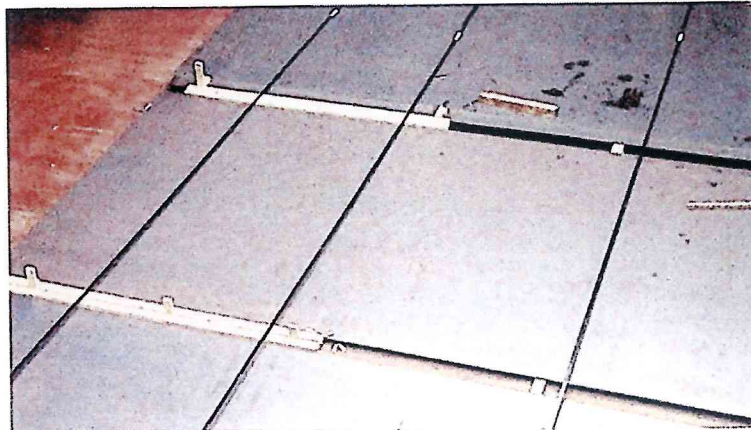
support tiers

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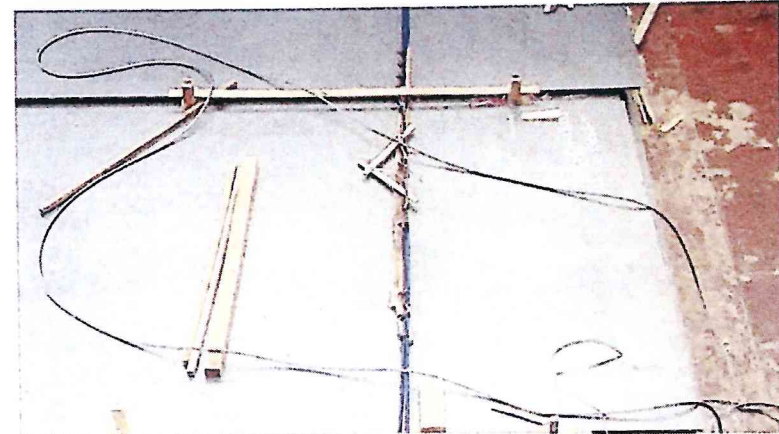
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Steel Plate

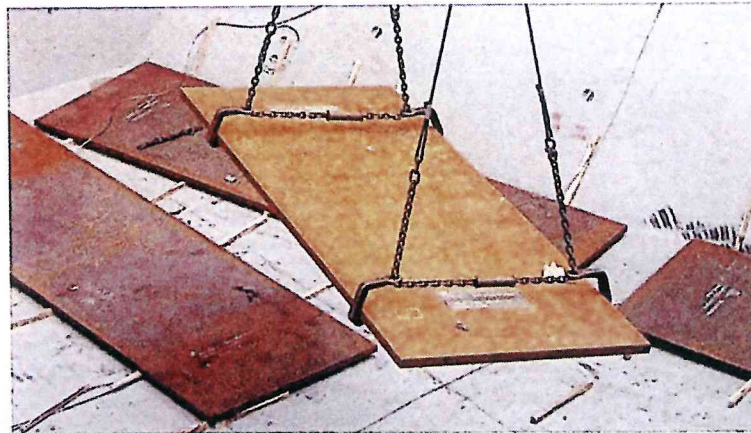
Condition of steel plates on arrival at discharging port.



✓ Good stow, lashing and use of dunnage



✓ Good stow; removal of the lashing

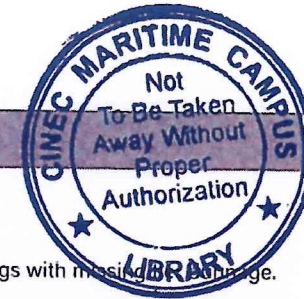


✓ Discharging of unbundled, unpacked steel plates



✓ Discharging of unbundled, unpacked steel plates. Use of 'C' hooks and a spreader

Steel Plate



Use of a forklift truck for the discharging of steel plates in a hopper-type cargo hold. Handling of steel plates underneath the coamings with missing dunnage.



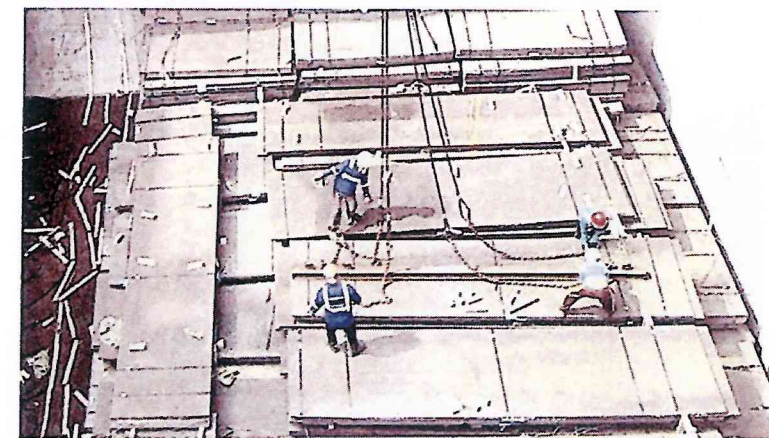
✗ The fork is used to separate the plates and create space for placing dunnage before the final lift is done with the truck



✗ The absence of dunnage between the plates creates extra work and also risks cargo damage in this process



✓ The steel plate is pulled out of the under-coaming space for direct access with the crane



✓ Discharging of bundled steel plates. Use of 'C' hooks and a spreader

Steel Plate



✔ Use of a forklift truck for the discharging of steel plates in a box-type cargo hold



✔ Use of a forklift truck for the discharging of steel plates in a hopper-type cargo hold. Handling of steel plates underneath the coamings



✔ Discharging of unbundled, unpacked steel plates



✔ Jurong Port is equipped with side-loaders with an SWL of 22 tonnes each

Steel Plate

Notes

- Tank-top load limits not to be exceeded. Consideration to be given to the hopper areas, where the load limits may be smaller.
- Tank-top to be prepared with appropriate hardwood dunnage to prevent the steel plate bending or buckling. The spacing of the dunnage should not exceed 3 metres. Shorter pieces may also be used.
- Dunnage to be of hardwood with a minimum cross-section of 50 mm x 50 mm for all tiers except for the tank-top, where it should be 100 x 100 mm.
- Dunnage between tiers to be laid in a vertical line to prevent waviness in the steel plate.
- Lashing wires, spaced not more than 3 metres apart, to be positioned on the tank-top in preparation for the final lashing of the stow.
- The full stow may be lashed in one block. Alternatively, the last two tiers or the last tier of steel plates should be lashed.
- Separate tiers or bundle heights (between horizontally placed dunnage beams) should not exceed 100 mm.
- A minimum clear distance of 100 mm is required between the edges of the steel plates and adjacent cargo or bulkheads. This distance should be properly dunnaged.
- All tiers to be stowed level.
- In the cargo compartments, where possible, safe passage should be provided directly from the ladders to the top of the cargo stow. In bulk carriers, this access should be provided directly from the Australian ladders. Safe access should also be provided from the tank-top to the top of the cargo stow.

Pipes

General

Pipes are long, circular, hollow section tubes used for transfer of liquids and gases. They are shipped in all manner of sizes and configurations, from bundles of finished steel small-bore pipes to large rubber-clad pipes that are destined for the offshore sectors. The ends of the pipes may be threaded, bevelled, flanged or swaged, all of which are prone to damage. Pipes are frequently shipped with protective end covers, which are sometimes supplied loose and, if so, will need to be fitted prior to loading.

Bundling

Small to medium diameter pipes may be bundled. The bundle usually takes a hexagonal shape and can also be packaged, depending on the finishing of the pipes. Only pipes of the same diameter should be bundled together.

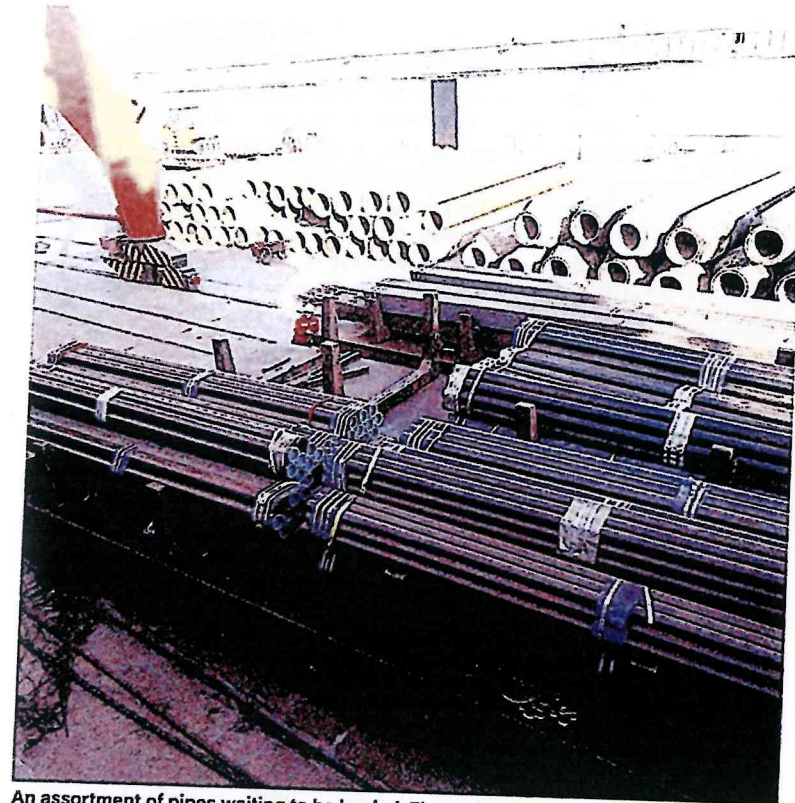
The bundling of small diameter pipes is usually made with steel strapping. The strapping should be tightly applied to avoid loose bundles with a failed hexagonal shape.

The bundling may also take a square shape, where dunnage is used between the tiers within the bundle.

Bundling must not be used for handling, tip-lifting or overhead transfer.

Medium diameter pipes may not arrive in a bundled form and may be loaded as single pipes.

Large diameter pipes usually arrive in an unbundled form and are loaded as single units.



An assortment of pipes waiting to be loaded. Flanged, rubber-coated pipes in the background and bundles of finished steel pipes with pipe-end caps on the trailer

Pipes

Dunnage

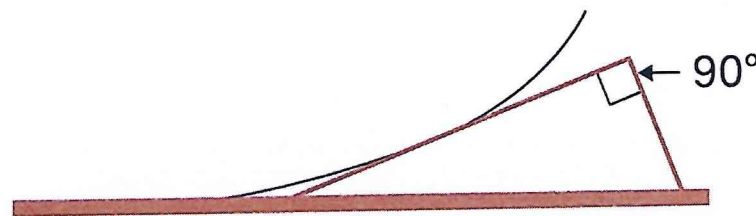
In the hold, dry, bark-free hardwood dunnage should be laid on the tank-top in preparation for loading. Rounded timber, timber with damaged or crushed corners, or non-square face dunnage must not be used. Only square one-layer dunnage should be used. Double-stacked, rectangular dunnage or 1 on 2 stack dunnage arrangements must not be used. The dunnage should be of 75 mm x 75 mm cross-section and laid athwartships, in rows of up to a maximum of 3 metres apart. The first and last rows should be no more than 1 metre from the pipes' ends. The dunnage should extend on the hoppers and side bulkheads. Where the pipes have flanges, bell ends, swaged ends, bevelled ends, etc., the dunnage laid at the tank-top should be of square cross-section, to protect the pipes' ends from damage as a result of contact with the tank-top.

The exact arrangement for dunnage will depend on the type and weight of the pipes and the number of tiers in the stack. If the stow consists of eight tiers or more, the dunnage at the tank-top and between the first three tiers should be of hardwood. Soft wood dunnage boards should also be laid against the ship's side structures to prevent steel-on-steel contact and to prevent movement. Dunnage between tiers is a requirement for bundled pipes. For single loose pipes, dunnage is not always required. However, the top tier requires dunnage between the pipes and between the stow and the side bulkheads to prevent horizontal shift.

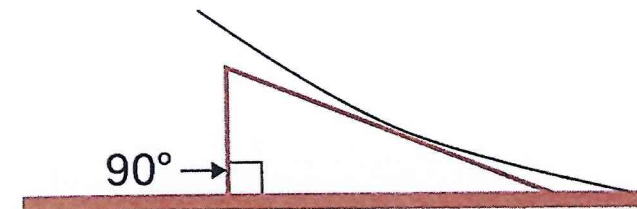
The first tier of large diameter pipes will, additionally, require wooden wedges on both sides of each pipe to be nailed on the dunnage planks. The wedges should be positioned at both ends and in the middle of the pipe. No dunnage will be required between the subsequent tiers, as the pipes are stowed in the cantlines of the lower tiers.

Dunnage may be required between the tiers of single small to medium diameter pipes, where these are loaded in the under-coaming spaces. In this case, dunnage should be of 75 mm x 75 mm square cross-section. If the pipes are bundled in a hexagonal shape, and where dunnage is to be used, consideration should be given for the increase of broken stowage and the volumetric capacity of the cargo compartment.

Bundles in rectangular or square cross-section form usually arrive with dunnage within the bundle, allowing for proper stowage. Where there is no such dunnage, athwartships dunnage between the tiers is to be used.



Correctly positioned wooden wedge



Incorrectly positioned wooden wedge

Pipes

When pipes are stowed on the hatch covers, soft wood dunnage boards should ideally be positioned over the hatch covers' transverse stiffening members. Each pipe should be hard up against its neighbour and, for loose pipes, wedges inserted on either side of each pipe in the lowest tier. The wedges should be nailed to the underlying dunnage boards to prevent the pipes from rolling.

Where the holds taper at the forward/aft ends, additional steel or timber structures might be required to support the pipes at the wider end to maximise the use of the available cargo space. Due consideration should be given to the strength of these structures and that of the hopper tanks.

Any such structures constructed of steel should be lined with a suitable material, such as timber, rubber, etc.

Suitable protective material should be placed on the pipes in way of lashings to protect the surfaces. This could be pieces of timber dunnage, rubber matting or pipe edge protectors.

Where large diameter pipes are loaded, a solid dunnage structure is usually required to be built between the ship's sides and the pipe stowage.



Dunnage being laid on the tank-top in preparation for the loading of loose pipe

wooden wedges
s. The wedges
ce. No dunnage
re stowed in the

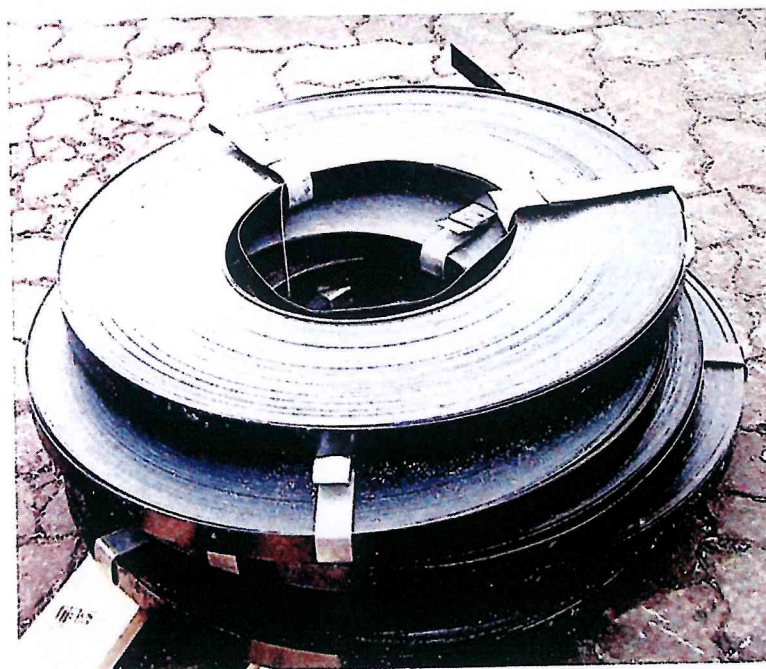
o medium diameter
In this case,
If the pipes are
used, consideration
olumetric capacity

arrive with
ere there is no such
sed.

Pipes

Lashings

When the cargo is stowed across the full width of the cargo hold, the pipes are prevented from shifting by the friction resistance of the timber dunnage used in the stow and the additional timber dunnage against the bulkheads. The top two or three tiers of pipes may be additionally segregated with rubber sheeting to prevent shifting/sliding of the cargo. Wire ropes or nylon web lashings are used to secure the stow in a single block and prevent the initial movement of the pipes. All lashings should be tight and well made. The Master should be supplied with certificates for all the lashing equipment used.

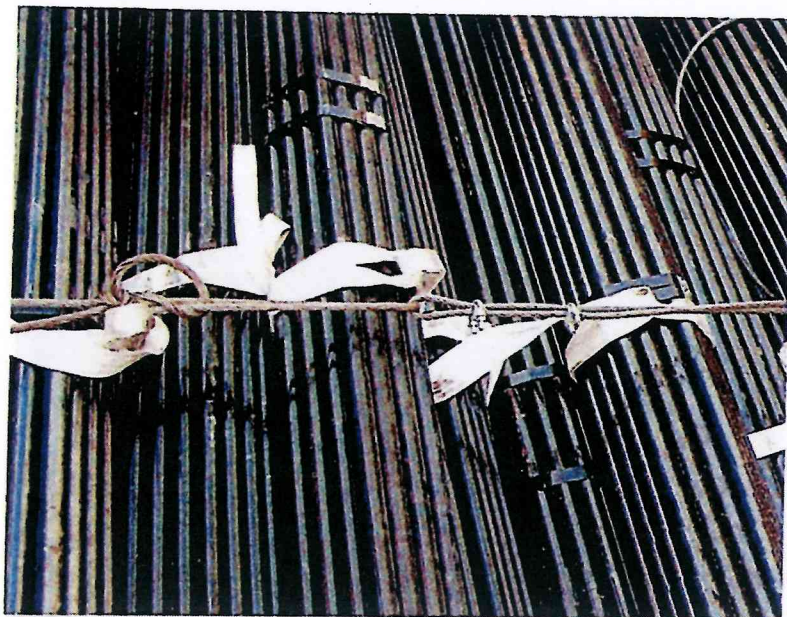


Metal strapping used for securing pipes. The tightening should be made with the use of pneumatic tools



Nylon web strapping used to lash a stow of medium-size pipes. The lashing is made only on the top tier of pipes in a box-shaped cargo compartment

Pipes



✘ Insufficient number of grips used and the saddle should be on the live wire



✘ Insufficient number of grips used and the saddle should be on the live wire

tips direction
w to secure
e minimum
imum of three
d pipe edge
reduce the



lashing is made

Pipes

Stowage

Pipes may be stowed in the hold or on deck. It is usual to stow steel pipes aligned in a fore-and-aft direction, although it is acceptable to stow pipes athwartships in the middle of the stow or across the ends of box-shaped holds provided that the pipes are of a similar length to the width of the hold. Steel or timber constructions may be required to fit the slope of the hoppers on bulk carriers, particularly in the forward and aft cargo holds where the tank-tops taper – it is not acceptable to fan out the stowage of pipes to fit the shape of the hold.

A stowage of pipes should ideally be of a single size and type of pipe. If different sized pipes, or pipes with different coatings or end finishes, are stowed together, the block is unlikely to be uniform and damage to the pipes may occur. If different sized pipes are stowed in one block, the larger diameter/heavier pipes must be at the bottom of the stow.

When pipes with differing characteristics, such as coatings, end fittings, etc., are to be loaded, the shipper should be consulted to confirm that the intended arrangement is satisfactory.

When pipes have flanges, bell ends, swaged ends, bevelled ends, etc., they should be stowed such that the flange is at opposite ends of the stow on alternate rows. This may involve stepping the face of the stow to achieve, but it will ensure a uniform block stow.

For the heavier and/or larger diameters of pipe, the shipper should be consulted with respect to the maximum number of tiers that may be stowed.

Each pipe should be stowed such that it is hard up against its neighbour, positioned in the cantlines of the row below.



Two uniform stows of pipes. Note that the swaged ends are stowed at opposite ends on alternate layers and the faces are stepped accordingly

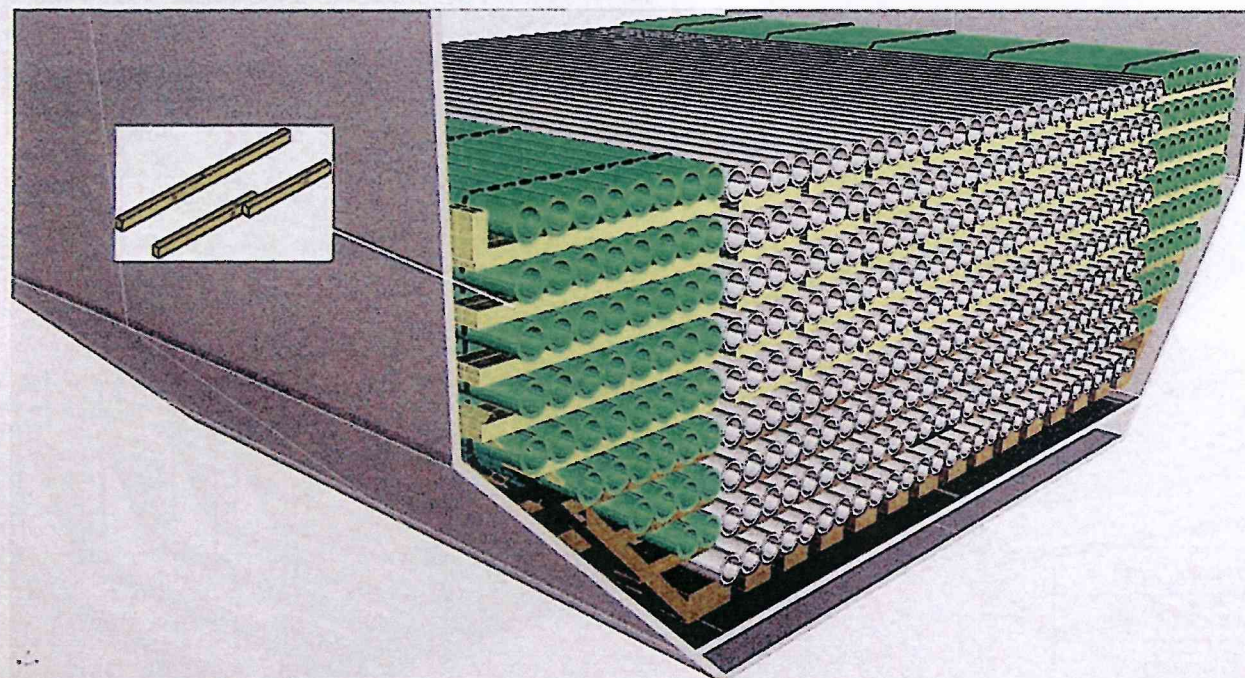
Pipes



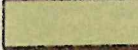
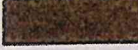
Correct Stowage, Lashing and Dunnaging

All schematics are indicative.

The first layer of tank-top dunnage should be hardwood of size 75 mm x 75 mm.
The subsequent two tiers of dunnage should be hardwood of 75 mm x 75 mm.

A minimum of two wires or nylon web straps should be positioned on the tank-top and passed athwartships at a spacing of approximately 3 metres.



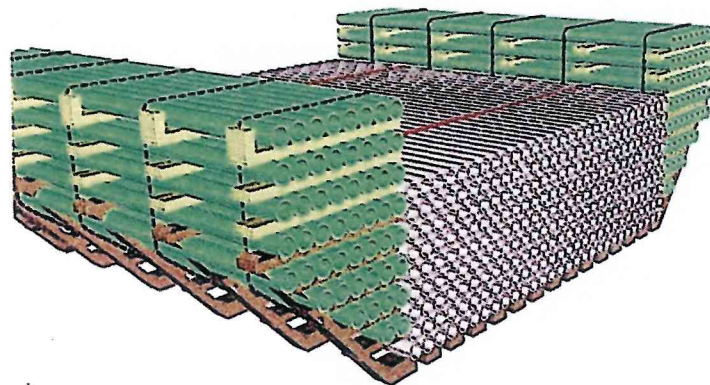
	Under-coaming stow
	Open hatch stow
	Soft wood dunnage
	Hardwood dunnage



at opposite ends on

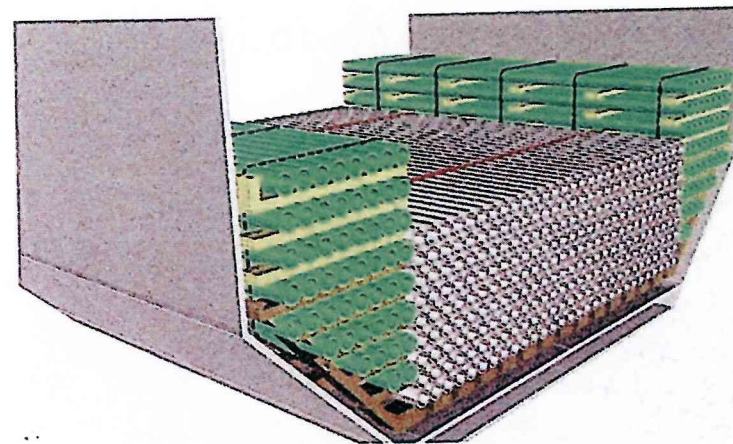
Pipes

Schematics of the dunnage and lashing to be used for a stow of pipes. If the stow under the open hatch is pre-slung, dunnage does not need to be used for this part of the stow. Dunnage should be used for the under-coaming stow, to allow the pipes to be lifted by forklift truck and moved to an open hatch area.

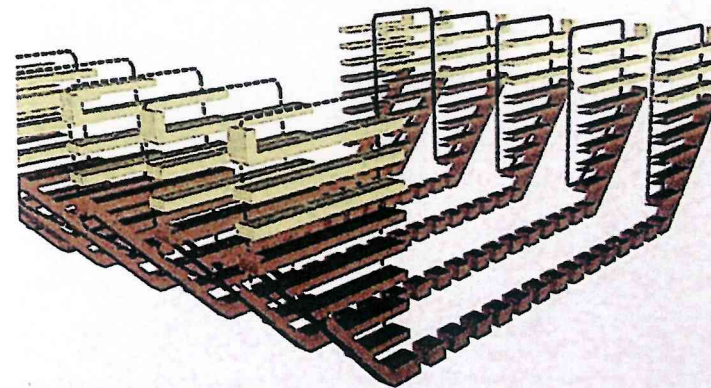


The under-coaming stow is lashed separately to prevent collapse of the stow during discharging

	Under-coaming stow
	Open hatch stow
	Soft wood dunnage
	Hardwood dunnage

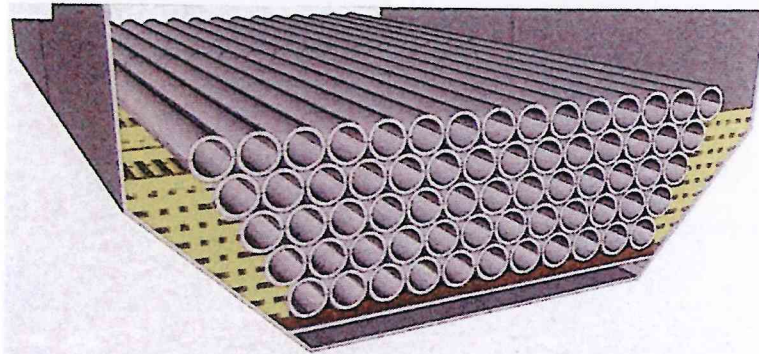


The stow under the open hatch is lashed separately and does not require dunnage except for the first tier to avoid contact with the tank-top



Pipes

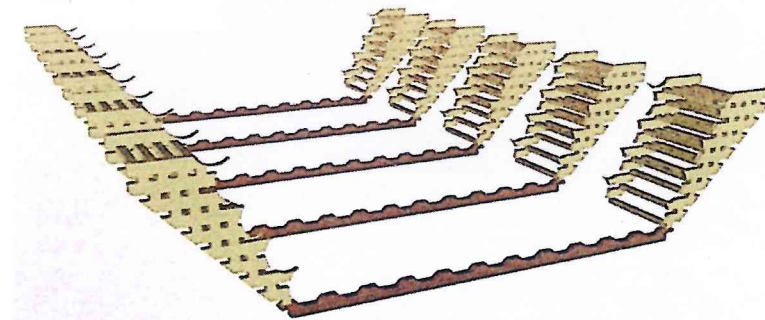
Indicative schematics of medium or large diameter pipes loaded as a homogeneous stow, with construction of a dunnage stool between the stow and the bulkheads. Wooden wedges should be used on both sides of each pipe from the first tier. For long pipes, three sets of wedges will be sufficient.



Full stow of longitudinally-loaded single pipes. Dunnage stool built between the stow and the side bulkheads



Indicative construction of pipe stow and dunnage



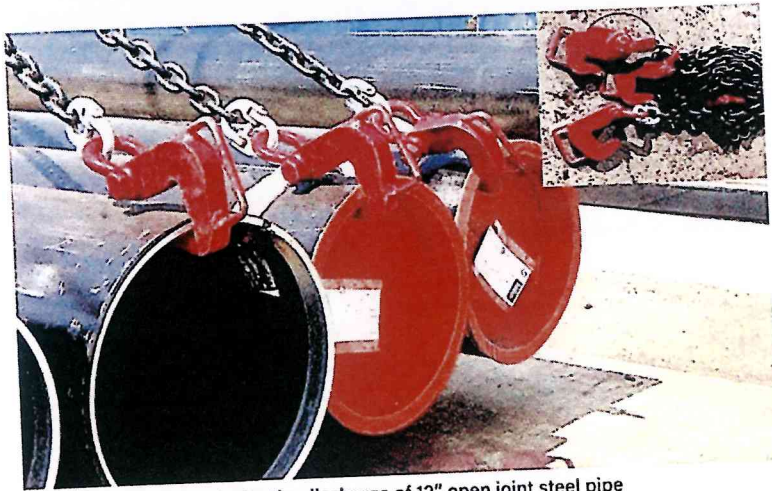
Indicative schematic of the dunnage stool for medium and large diameter pipes

	Under-coaming stow
	Open hatch stow
	Soft wood dunnage
	Hardwood dunnage

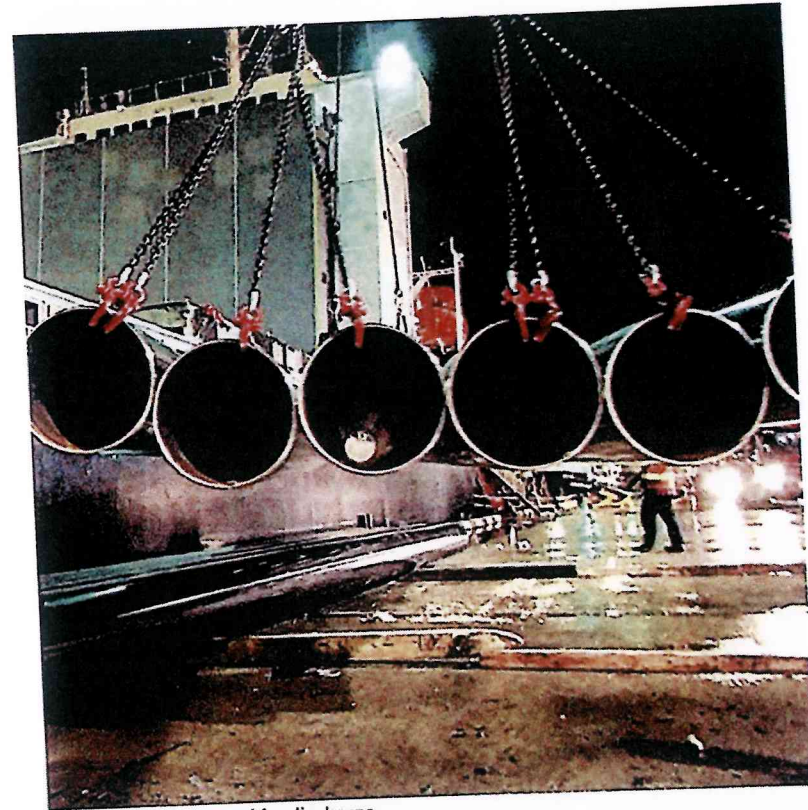
Pipes

Ports use nylon straps, in a basket hitch, and pipe hooks for the discharge of bundled pipes. These are sometimes rigged beneath a spreader, depending on the length of the pipes or whether the pipes are loose or bundled. For bundled pipes, pre-slinging should be in place for tip-lifting during the discharge operation. Bundling straps must not be used for tip-lifting and sorting hooks must not be used for overhead lifting.

Ports also use pipe hooks for the discharge of medium to large diameter pipes.



✓ Using pipe hooks for the discharge of 12" open joint steel pipe



✓ Pipe hooks used for discharge

Pipes



✓ Pre-slung bundled and packaged pipes on the quay prior to loading
Note: the pre-slings are for tip-lifting only



✓ 12" diameter pipes, bundled in pairs, pre-slung for tip-lifting and using nylon slings for a basket lift of eight pipes (four pairs)

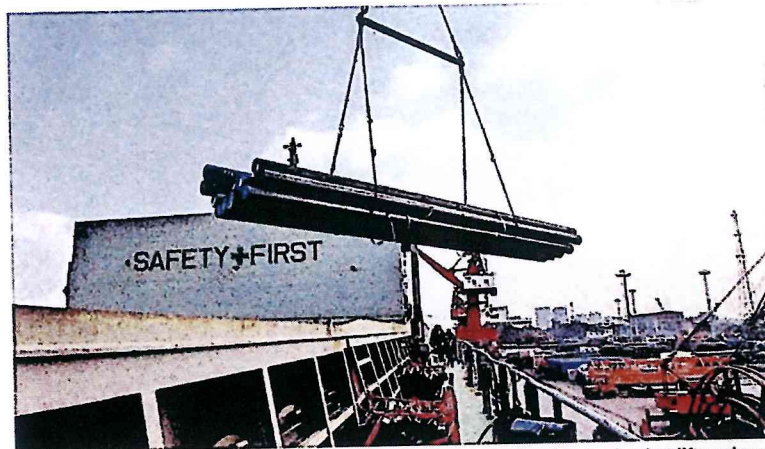


✓ Good-quality soft wood dunnage boards and wedges to be used on the tank-top or hatch cover. Ideally, the boards should be of 150 mm x 25 mm cross-section



✓ Dunnage laid on the tank-top and on subsequent layers of medium-size pipes

Pipes



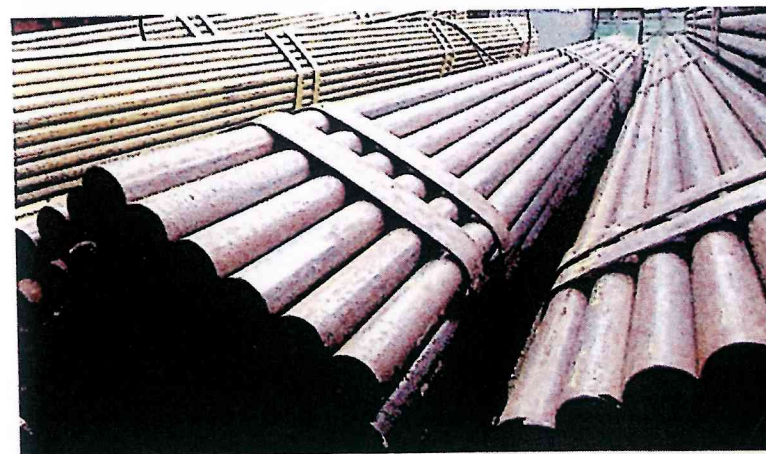
❌ Pipes being loaded over the ship's rail using a single wire-leg basket lift under a spreader. Using wires rather than slings could damage the surface coating of the pipes



❌ Bundled pre-slung pipes being loaded by basket lift
Note: the use of wire slings will damage the packaging and the pipes. Nylon slings should be used for the basket lift

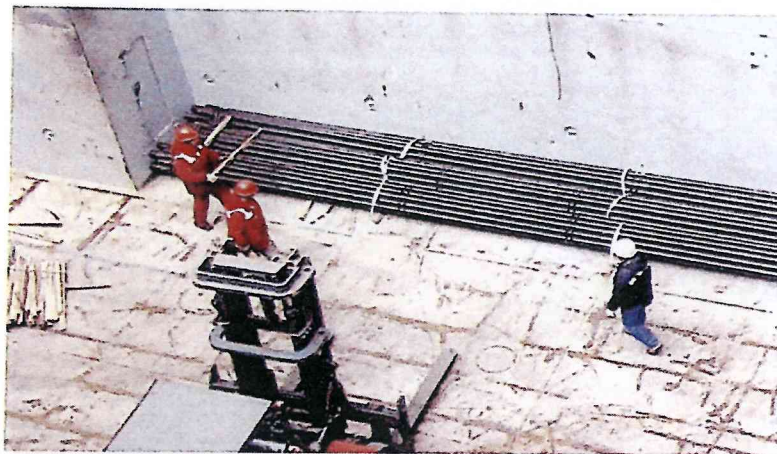


❌ Loose and badly secured pipe bundles

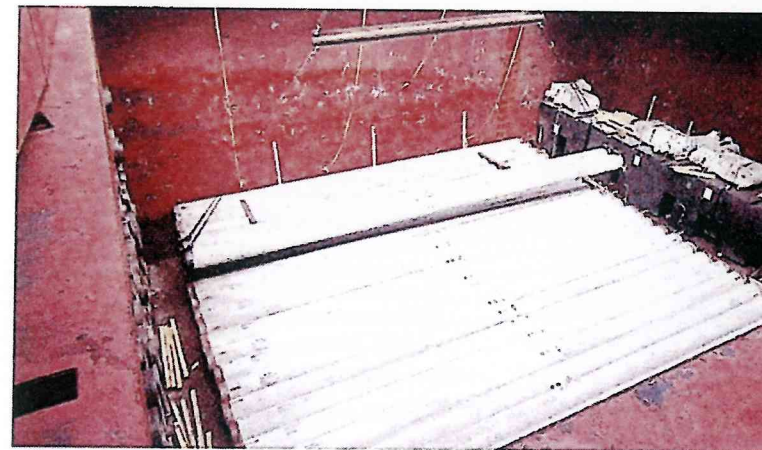


❌ Pipes strap-bundled into a hexagon shape, which makes a tight, efficient stow. The bundles, however, should be pre-slung for tip-lifting at discharge

Pipes



✔ A forklift truck is used to stow the pipes to the side of the hold. At the discharging port, if a forklift is not used the crane should be correctly plumbed to prevent the pipes from swinging when lifted



✔ It would be more appropriate and ultimately safer to stow alternative cargo under the overhanging 'tween deck before loading the pipes



✔ The tank-top space being used efficiently - shorter pipes are stowed in the narrower tank-top area, with the longer pipes in the open hatch area



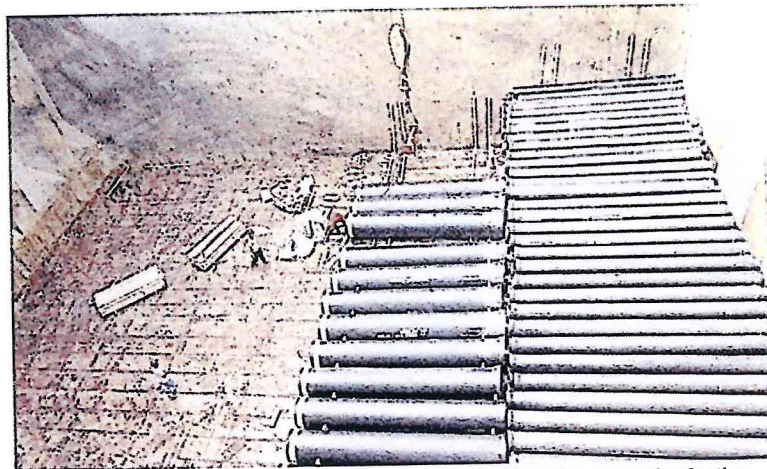
✔ Pipes stowed evenly and tightly across the width of the hold, with timber dunnage used against the port and starboard bulkheads

pipes. Nylon

t, efficient stow.
charge

ing of Steel Cargoes

Pipes



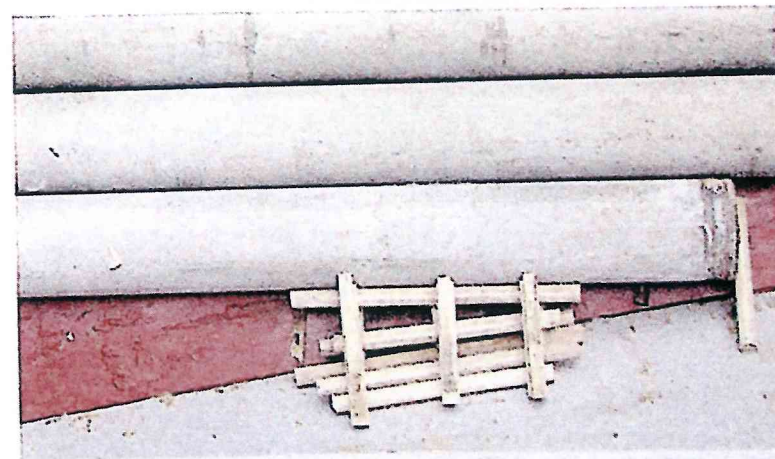
✓ Dunnage laid on the tank-top and against the bulkhead in preparation for the second row of pipes. Chocks have been used between the pipes for protection



✓ Wooden wedges used to secure the pipes horizontally




✓ Stows being built up in a safe and efficient manner. Steel plates have been laid across the pipes to protect them and to spread the load of the backhoe




✓ Dunnage structure in progress for the hopper area and the first tier of pipes. The structure should be continued vertically for the next tiers of pipes

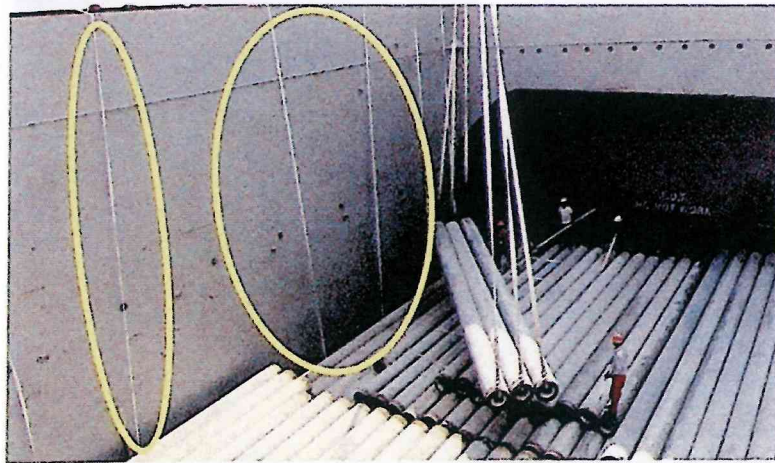
Pipes




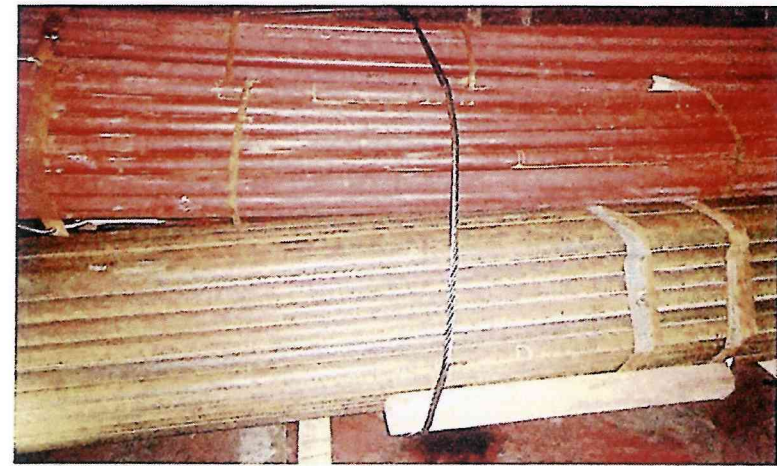
 The dunnage does not reach the bulkhead. It is likely to shift in transit




 Chocking can be seen on the bulkhead and lashing work is in progress

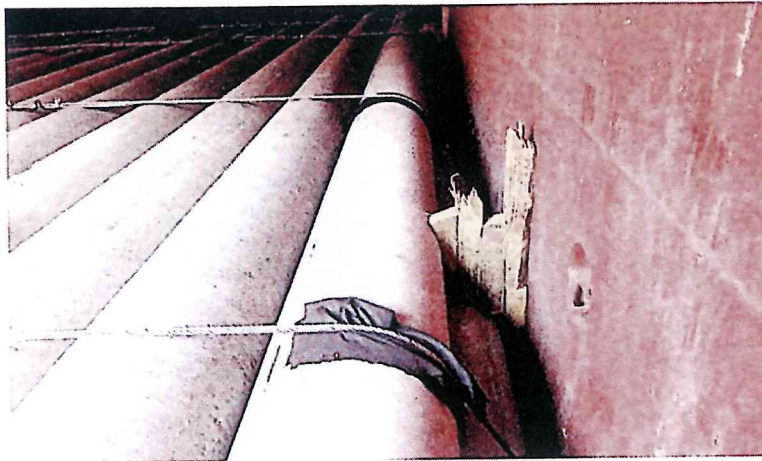


 Loading in a box-shaped cargo hold. The web lashing was laid on the tank-top and prepared for the final securing of the stow



 Bundles stowed on dunnage, with timber used as protection around one edge, but not all. Wires can damage these small-bore pipes

Pipes



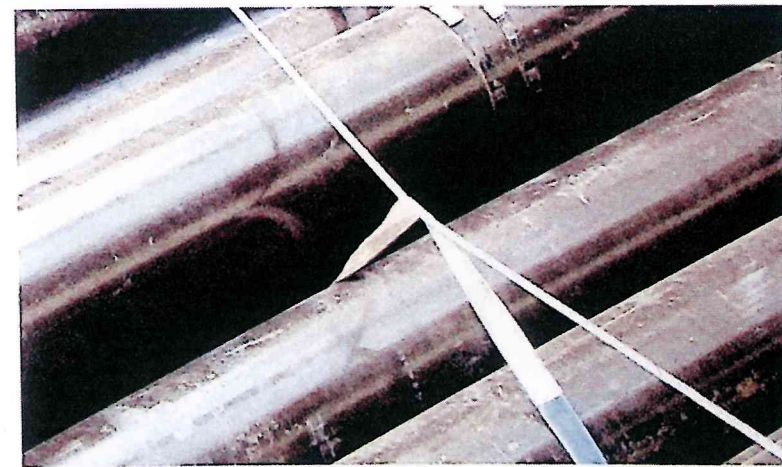
✘ Suitable protection material such as rubber, tyre pieces or thick plastic should be used



✔ Web lashings being rigged across bare steel pipes. Dunnage used correctly between the upper tier and the bulkhead



✔ Web lashings used across the upper layer of coated pipes



✘ Incorrect application of the wire lashing. The wire lashing is not tight and it will cut the sling

Pipes



✘ Ineffective wire lashings. The bundles appear to have spread out, damaging the adjacent wooden crate



✔ Stanchions were fabricated to permit partial block storage on the tank-top, adjacent to other cargoes



✘ Pre-slung bundles lashed into a 'pen' created by fabricated stanchions. Lengths of timber should have been used to protect the pipes from the steel wire



✘ All lashings should be tight and well made, with provision for adjustment of the turnbuckle during the passage