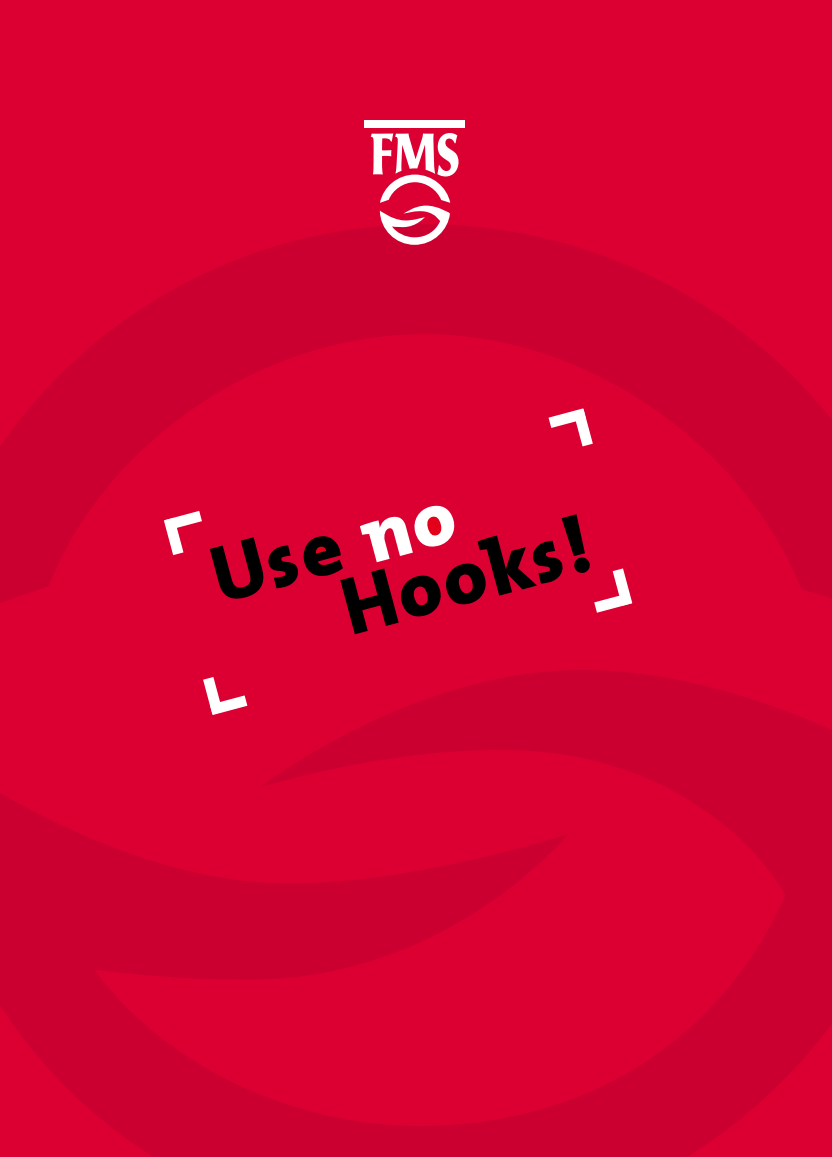
FMS
Use no Hooks!

FR. MEYER'S SOHN (GMBH & CO.) KG

Use no Hooks!

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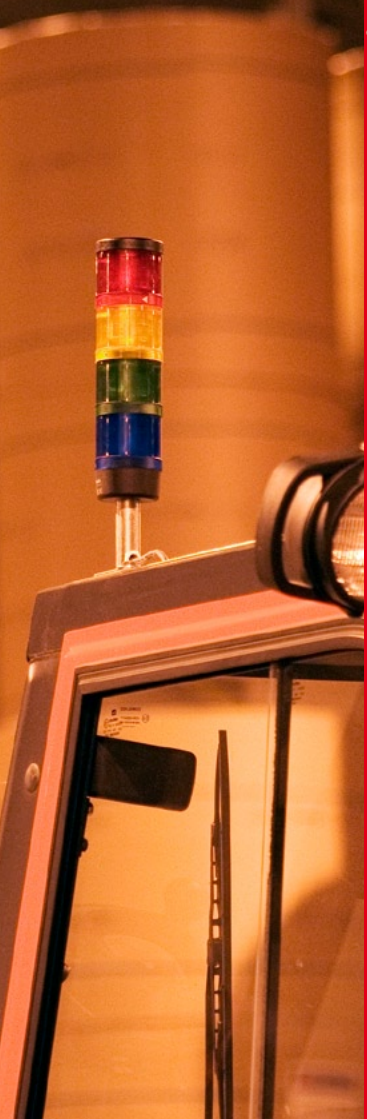

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Use no Hooks!

Introduction

Introduction

Use no Hooks

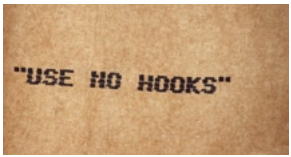
For the longest time, this warning symbol was considered essential for the shipment of reels of paper. Up until the end of the 1980‘s, it was common practice to use hooks to set upright the vertically loaded heavy paper reels.

Even today this handling symbol can still be found on some reel labels. Information for the correct handling of these products therefore existed already at that time. In the meantime, these products have increased in quality and value.

The handling technology has developed in line with constant improvements in the paper industry. The supply of correct information is still as important today as it was then. This manual is intended to serve as a reference for anyone working in the transportation and paper industries. Numerous national and international standards, directives, specifications and laws regulate the theory. A large number of supplementary loading recommendations are available from the manufacturers. The pressure of time and cost as well as the increasing complexity within the transport chain, push these requirements partially into the background. The flexible, often situation-related interpretation of loading guidelines frequently contains a significant „grey area“, with which logistics experts are familiar. By

making specific reference to individual transportation obstacles, which collectively can give rise to considerable problems, this manual is intended to provide the user with a multifunctional tool enabling them to recognise this „grey area“.
This manual also offers the user the possibility to ask those working within the transport industry about specific problems in the transport chain or to provide such information.
Photos, graphics and working tables appropriately complement the individual subject areas.
Extensive extracts from this manual are available at

http://www.fms.de
The photos serve only to supplement the text and do not in any way provide a solution when viewed in isolation or without specific reference.
The information contained in this manual has been carefully researched and checked by both the author and publisher. Nonetheless, no guarantee is given for its correctness and no claims made for its completeness. The author or publisher and his representatives disclaim all liability for any personal, property or financial loss.



Sales requirements 2

Sales requirements

Unit compatibility

On the sales side, it is important that all customer requirements are fulfilled. As far as possible, the individual means of transport must be checked with regard to their compatibility with the unit:

- Individual dimensions
- Load distribution plans
- Floor loading capacities
- Loading options

Unsuitable cargo measurements

If these requirements are not fulfilled, a lucrative order can quickly become a time-consuming problem.

Production plants

The majority of production plants today are highly modern and designed for the future. Nonetheless, certain routines can lead to deviations, particularly with regard to quality certification. It should be kept in mind that the producer, as the first link in the transport chain, has a considerable influence on subsequent events. Not every step in the production process can be supervised one hundred per cent. It is next to impossible to foresee all the effects a small technical change could have on other links in the chain, but early involvement of logistics personnel can help eliminate many problems.

Faulty section of a slat conveyor for paper reels

Manufacturing defects are sometimes knowingly or unknowingly passed on to the next partner in the transport chain.

Protruding winding core

Incorrect stacking

Cargo-handling requirements

3

Cargo-handling requirements

The quality of the cargo-handling operation is crucial for success or failure within the transport chain.
There are different professional cargo-handling operations for example:

- Cargo-handling within the production plant
- Specialised cargo-handling operators
- Cargo-handling terminal which only occasionally handles forest products.

The following applies to all: New products, new dimensions or changes in quality require good preparation. A requirement profile developed in advance ensures a smooth cargo-handling procedure later on.
Realistic observation beforehand will help to minimize surprises. We have found the following rating system to be useful and reliable:

1 = Very good	2 = Good
3 = Satisfactory	4 = Sufficient
5 = Poor	6 = Unsatisfactory

Rating of cargo-handling operators

Warehouse

Floor

A suitable floor is one of the basics for professional and correct paper handling.
The floor should be in a perfect condition at the outset.
Temporary repairs and other measure like for instance using materials such as wooden boards, paper etc. are often inadequate.

Check:

- Is the floor clean, dry and free of moisture, oil patches, lift truck soot, powder, dust, etc.?
- Are the corners of the warehouse and areas around the pillars clean?
- Do the neighbouring storage areas give the same impression or was one area refurbished only, cosmetically'?
- Are the floor markings for the individual storage locations easily visible and intact?
- Do the individual storage location sections correspond to the dimensions of the goods to be stored?
- Is the floor loading capacity per square metre appropriate for the goods and cargo-handling equipment?
- Is the floor level even throughout (particularly in the area of the pillars)?

Clean warehouse, even floors

Accumulated debris around pillars

Unprotected pillar

Walls

The walls must be free of moisture, mould and heavy dirt deposits. It must be ensured that half-height walls and diagonal timberwork are not fouled by bird feathers and bird excrement.
The walls should not only be completely impervious to light, but also wind-tight in a westerly facing direction, so that in adverse weather conditions, powder snow, for example, must not be able to enter the terminal.

Roof

The roof must be completely water-tight at all points.
Leaks must be repaired immediately. The roof must also be able to withstand extreme weather conditions. There should be no birds within the warehouse, since they will sooner or later soil the cargo.

Bird excrement

Lighting

Good lighting within the warehouse creates a pleasant working atmosphere. All lights must function. When using fluorescent lamps, a protective cover should be used to prevent glass splinters falling on workers and stored goods.
If necessary, the hatch gates can be provided with a rotatable spotlight for better illumination of the loading platforms of containers, trucks, etc.

Well-lit working area

Gates

The gates should be large enough to cope with all expected traffic. The height should be sufficient to allow fork-lift trucks with high masts to pass through.
The functionality of the warehouse is often improved by additional, larger gates for trucks, trailers and van carriers.

Ample sized entrance

Visible space beneath rolling doors

Spacious loading and unloading area in the warehouse

The working area around the gates should offer sufficient space for loading/unloading of the individual trucks.
Rolling gates should open and close perfectly and completely. Sliding gates should not be hindered in their operation by cargo.
When the gates are closed, snow, water, etc. must not be able to enter the hall through the door seals.

Loading ramps

The loading ramps must offer sufficient space of movement for fork-lift trucks. Lifting or loading ramps must be designed to take the weight of the goods to be loaded.
The vehicles provided for loading purpose must be secured to prevent them rolling. Manual or automatic restraining systems are used for this purpose.

Mobile loading ramp

Loading ramp too steep

Facilities

A clean storage area makes a considerable contribution towards a professional cargo handling. This generally means that the hall is dry, tidy and free of smell.

Floor sweeper

Concave traffic mirror

Bracing supplies

Edge protectors for pallets and reels

Checks:

- Are compressed-air connections with pressure reducers and water separators available?
- Are sufficient power points available, also 380 V if necessary?
- Are there writing desks in the vicinity of the loading door?
- Are there one or more areas for storing cargo securing devices (see also Chapter 6)?
- Are there telephone connections (internal)?
- Are there safety areas for workers and truck drivers?
- Are there sufficient dustbins (material separation)?
- Are there sufficient signs in the warehouse (escape routes, fire extinguishers, working areas, traffic routes)?
- Are all traffic routes clearly visible?

- Are overhead mirrors or equivalent available?
- Are edge protectors (collision protection) available in sufficient number?
- Are there sufficient „docking stations“ for reading the barcode scanners?
- Is a radio system installed in the building?

Cargo securing

4

Cargo securing

Cargo securing is a very often discussed subject. National and international guidelines, specifications and technical literature cover a large number of issues. However, apart from a few special product groups, statements specific to a certain mode of transportation are rare. Matters are made more difficult by statements such as „do not move“ (when does movement start?), „Voids must be avoided“ (what is a void? One hand width?). Owing to the endless combination options, coupled with the various solutions of different countries, this subject cannot be dealt with conclusively. The main aim is rather to sensitize those concerned with cargo securing issues.

Lost cargo

„This cargo is so heavy it won't move"

If a truck is travelling at 50 mph, its cargo is moving at the same speed!
It generally applies that cargo will move irrespective of its own mass.

Horizontally loaded jumbo reels

Within the transport chain, the cargo is subject to various stresses:

E.g. cargo pile-up in railcar

- Single, very heavy impacts

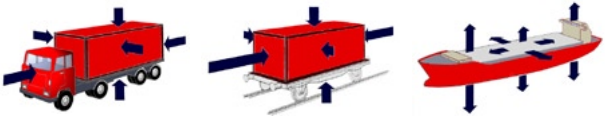
E.g. hanging container

- Repeated, heavy impacts (container handling, van carrier, container bridge)

E.g. cargo shifting

- Continuous, brief impacts (rail transport, seagoing vessel)

The impact force is expressed in g, where 1 g corresponds to the force of gravity of 9.81 m/s^2.
The impact forces occur on different means of transport as follows:



Means of transport: truck, rail and vessel

Mode of transport	Forward acting forces	Backward acting forces	Sideways acting forces
Truck	1.0 g	0.5 g	0.5 g
Rail			
Rail cars subject to shunting [switching]*	4.0 g	4.0 g	0.5 g (a)
Combined transport**	1.0 g	1.0 g	0.5 g (a)
Vessel			
Baltic Sea	0.3 g (b)	0.3 g (b)	0.5 g
North Sea	0.3 g (c)	0.3 g (c)	0.7 g
Unrestricted	0.4 g (d)	0.4 g (d)	0.8 g

1 g = 9,81 m/s^2
The above values should be combined with static gravity force of 1.0 g acting downwards and a dynamic variation of:
(a) = ± 0,3 g (b) = ± 0,5 g (c) = ± 0,7 g (d) = ± 0,8 g

* The use of specifically equipped rolling stock is advisable (e.g. high-performance shock absorbers, instructions for shunting [switching] restrictions).

** Combined transport means wagons [cars] with containers, swap-bodies, semitrailers and trucks, and also block trains (UIC and RIV).

The force to which a cargo is subjected at an assumed g-value of e.g. 0.8 g (sharp braking of truck) is not always evident. An impact force of 1.0 g (= gravity) corresponds to an angle of 90° (see next page).

Cargo unit at 90° angle = 1 g

Cargo unit at 53° angle = 0.8 g

Cargo unit at 30° angle = 0.5 g

Braking causes negative impact.
Movement of the unsecured cargo is only prevented due to friction.
Friction is a force opposing the relative motion of two bodies or surfaces in contact. Friction is based on the roughness of the surfaces that results in the force opposing the motion of the surfaces in contact. Frictional force is expressed in μ.

	Coefficient of sliding friction „μ“	
Paper on paper	0.4	
	Paper, wrapped in paper	Paper, unwrapped
Paper on serigraph	0.3	0.25
Paper on serigraph and joloda trailer	0.25	0.35
Paper on wood	0.4	0.45
Paper on metal	0.3	0.3
Paper on plastic	0.25	0.15

Coefficients of sliding friction (Source: VDI)

This table (paper on serigraph, 0.3 μ) and the previously mentioned impact forces show that the cargo would start to shift already at a comparable angle of inclination of only 17°.

Cargo unit at 17° angle = 0,3 μ

Unsecured cargo gaps

If there are (even the smallest) gaps, the cargo will shift into these gaps in the event of impact.

Consider tilting a truck, railway wagon or container at an angle of 53° and ask yourself whether you would like to be standing under the cargo.

Insufficient blocking / bracing

Securing with airbags

Securing cargo units 5

Securing cargo units

One of the most important requirements for securing loads successfully is the sturdy cargo unit. We have seen numerous cases where it has been put into question whether or not the cargo unit was at all suitable for transportation. Particularly in the area of paper in sheets, packaging stability often gives way to commercial requirements.

Slipped cargo unit

How stable is your cargo unit if the vehicle has to brake sharply? Is there any change to the external geometry?

Does the unit remain deformed or is it restored to its original shape? Cargo gaps increase on impact (incorrectly often referred to as the „domino effect“).

Ideal stowage

It is therefore important to ensure that all units are stowed form- or friction-locked.
In the case of paper in sheets in particular, the many different sizes pose a particular transport challenge. Exact pallet sizes cannot be stocked to meet all customer requirements.

If the dimensions of the pallet are larger than those of the paper in sheets, the pallet protrudes below the paper, making securing of the cargo difficult.
The use of intermediate securing devices or filling cargo securing means (see Chapter 6) is absolutely necessary.

Form-locked cargo securing

The form-locked method offers the advantage that the cargo is able to support itself against the force of impact (e.g. sharp braking, railcar shunting) on a sturdy structural member or cargo securing system.

This also means that the adjacent cargo unit arranged in the opposite direction to the force of impact is also supported form-locked and this action is transferred to the next near unit, etc. The force of impact increases as a whole.

Collision damage

How much force is each unit able to absorb?
It is the horizontal forces forward/back (shunting impact), left/right and the vertical forces up/down (hard setting down of the

container) or a combination of these (sea transport) that act on the cargo. Normally, cargo will be subjected to a combination of these forces. The majority of these cargo units are able to absorb vertical impact forces better than horizontal impact forces.

As a consequence of the restoring moment of the cargo unit, the cargo unit gives the impression of being intact.

The unit may be slightly deformed under certain circumstances. With extreme crushing, the structure of the paper is permanently damaged. The true extent of the damage to the quality of the consignment initially becomes apparent at the printer.

Incorrect securing of a cargo often gives the false impression that a product has a bad quality.

In order to avoid taking any risks, the printer may refuse to take delivery of the whole consignment.

The necessary cargo securing measures do not always comply with the commercial requirements however, and no court would seriously recognise the commercial principle.

"Waves" in paper in sheets

Although some standards are applicable internationally, different procedures exist within the paper industry. Rather than offering numerous solutions, the purpose of this text is to sensitize the reader with issues which come up when securing cargo.

Means of transport

6

Means of transport

Truck

General

Acceleration see page 37

Some shippers will have little problem with the suitability of the vehicles provided. Other distributors will probably be faced with new challenges on a daily basis due to the significant variation in the quality and equipment of the vehicles to be loaded. The provision of one requirement profile for all forwarding agents is not always without problems, particularly when customers do pick up their cargo themselves (e.g. delivery condition „ex works“). However, safety is the main priority.

Transport requirements

Loading platform

No differentiation should be made between loading platforms, irrespective of whether the cargo consists of palletised products, paper reels, pulp or waste paper. Any differentiation would ultimately result in the wrong vehicle standing at the ramp in case of doubt.
The requirements for the vehicle should already be clearly specified when the vehicle is ordered and noted in writing. Only then are forwarding agents able to adapt to specific requirements in good time and any discrepancies during loading operations can be avoided in advance.

Condition of the loading platform

The loading platform must be clean, dry, free of smell and tidy.

Clean

All cargo residues must be removed. This also includes residues between the floor plate joints and in the area of the recessed lashing rings. If the loading platform is soiled or cargo residues are visible, the loading platform must not be used for loading purposes. Lift truck or other movements could loosen these foreign bodies and contaminate the cargo. Particular attention should be paid to plastic granulate or similar residual deposits.

Plastic granulate on loading platform

Foreign articles found on bales of woodpulp

For example, any contamination of pulp with this material can give rise to significant difficulties during subsequent processing.

Measures

As far as possible, another suitable vehicle should be used. If this is not possible, all responsible persons in the transport chain should agree to a provisional measure in writing.

In addition, photos should be taken of the respective vehicle clearly showing the conditions prevailing at the time.
The following measures can be taken: Sweeping clean, cleaning with compressed air, lining the loading platform with suitable materials.

When selecting suitable lining materials, it must be ensured that:

- These materials protect the cargo through the entire transport.
- These materials have sufficient thickness and strength.
- The cargo does not come into direct contact with the soiled loading platform at any point.
- The lining materials used for the cargo are suitable (e.g. do not place any plastic sheeting below pulp!).
- The lining materials are not damaged by the work of the lift truck.
- The customer should remove this additional product from the vehicle and dispose of it separately if necessary.

Dry

Dry means that the loading platform must not transfer any moisture to the cargo. Paper and pulp react hydroscopically. This means that the cargo would establish a moisture balance with the ambient climate. For this reason, also wet areas on the loading platform that do not have direct contact with the paper will affect the paper quality.

Wet floor

In general, the shipper should treat moisture or wetness with scepticism. Not everything that is wet has to be water. There are countless hazardous liquids that could have contaminated the vehicle floor. Loading personnel will often check a spilled liquid by touching it. Checks carried out in this way should be avoided.

Labels for hazardous cargo

Wet or moist areas on loading platforms are always a cause of complaint among customers or external inspectors during receiving inspections.

Measures

Another vehicle should be called if possible.

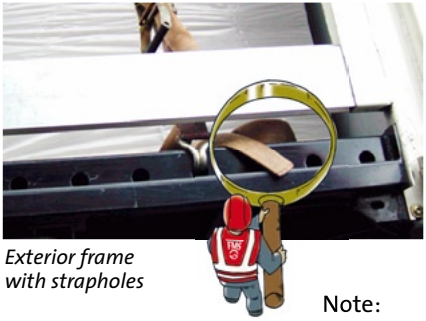
Layers of paper, cardboard, plastic, etc. are less suitable, as these already slip during

loading. In addition, it is possible that these materials penetrate during transport. The use of wooden boards as layers would be suitable, but these are normally very expensive. Old wooden boards are therefore used for this purpose. However, these are often soiled to the extent that they cannot be used as a layer for cargo. If the cargo does not have direct contact with moist areas, there is still a risk that the cargo indirectly absorbs moisture or smell from the contaminated loading platform.

Lined loading platform

Cargo securing devices and equipment

Cargo securing devices and equipment serve to fasten cargo units on vehicles. Several typical examples as well as information on correct use is provided below, which should not be seen as to be complete. There are vehicles that are specially equipped for the transport of paper reels on which cargo can easily be secured in an optimal manner. These vehicles are unfortunately not always available in sufficient number. For other vehicles, a combination of different cargo securing devices can often contribute to fast and effective securing of cargo.



Exterior frame with strapholes

If the vehicle is not provided with the necessary cargo securing devices such as general-purpose ratchet straps and anti-slip mats, the shipper should provide this material for the driver.

Lashing points and variable lashing systems

Lashing rings on the vehicle serve the direct fastening of the lashing straps.

Note:
Vehicles with flexible lashing points should be used as far as possible since exact positioning of the lashing straps can often prove very difficult.

Rusty lashing ring trough

Troughed lashing rings can be very stiff and rusty.
This makes it difficult to attach the lashing strap hook. For attachment of

lashing straps to the vehicle, claw hooks must be used. Under no circumstances must straps be placed across the yielding loading sideboard.

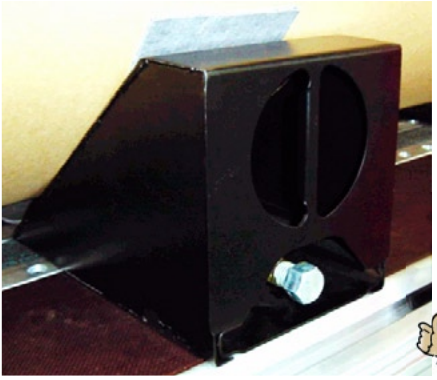
Perforated rails

Perforated rails are profiles provided with a series of holes. The rails are firmly embedded in the loading platform and connected to the floor. They also serve for receiving screw wedges.

Note:
Perforated rails in conjunction with screw wedges or clamping blocks offer a good basis for securing cargo. It should be ensured that the wedges are undamaged and move easily.

Partition bars

Partition bars are telescopic metal profiles that are capable of withstanding minor loads, but not concentrated loads.

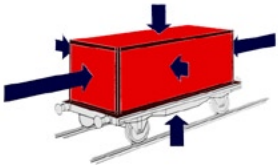


Perforated rail with screw wedge

Partition bar

Partition bars on their own are normally not suitable as cargo securing devices for paper reels and format paper on pallets as well as pulp. The partition bars are often attached to the tuck plates of the vehicle body. If the tuck plates are too thin or damaged, the necessary clamping force cannot be produced even after closing the locking lever. In this case, the partition bar serves only for visual purposes.

Rail



Acceleration railcar
see page 37

General

Compared to cargo securing on trucks, the requirements for securing cargo for rail transport differs considerably.

Very long distances are sometimes covered by rail. These long and continuous movements cause paper reels in particular to rotate about their winding axis. This causes abrasion marks on the reels and results in fine paper dust or paint to be rubbed off the railcar walls. This can lead to the packaging being completely worn through.

Worn barcode label

Under certain circumstances, barcodes and other labels are damaged or illegible.

The railcars are sometimes shunted repeatedly. Shunting impacts are more or less unavoidable. This should be compared with only 1 g in combined traffic (e.g. swap trailers and containers) or block trains that run straight from shipper to receiver.

Transport requirements

The conditions for rail transport are virtually the same as for road transport. The railcar must be dry, clean and free of smell (see also Truck, page 50).

Specials

Railcars in particular are loaded in large numbers directly at the paper mills. The loading areas are normally quite modern. Loading takes place within a warehouse or in an area that is sufficiently protected against adverse weather conditions. The loading area is usually at the height of the railcars to be loaded. The railcars can be accessed by lift truck over short ramps.

For the shipper, this has the advantage that the cargo can be set down at virtually any point on the loading platform, e.g. also in the centre along the length of the wagon.

Internal loading area

For the receiver whose unloading area does not have this type of ramp, this means that the reels placed in the centre cannot be unloaded from the side of the railcar. Alternatively, the reels are either pushed against the edge of the railcar from the opposite side using a second reel or drawn towards the edge using a rope or sling, etc., by lift truck.

Both methods are unadvisable and the ends of the reels can be seriously damaged due to an often uneven floor.

Long reach paper clamp

Railcars with sliding sides have large door openings for fast unloading. However, these openings also expose the cargo to the effects of weather, so that they can be damaged in the event of rain or if negligent workers

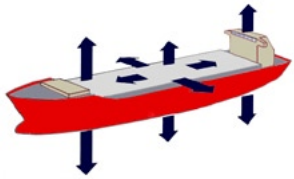
interrupt unloading to stop for lunch without closing the doors.

Wet paper reels

The degree of damage is increasing if these reels are stowed without further measures being taken. It is often incorrectly assumed that paper reels have waterproof wrappings.
On the other hand, it should be kept in mind that paper often needs to be handled in less than dry weather conditions. Therefore, the decision as to how wet the reels may become, in the end lies with the owner of the goods.

Container vessel

General



Acceleration sea-going vessel
see page 37

Nowadays, transport by container vessel is a daily occurrence. The quality of transport begins already with the ordering of the correct container (see also Chapter 7 Container dimensions) and correct loading and securing of the cargo.

Sometimes containers are subject to harsh treatment when being handled at the container terminal. During

its transport on the terminal by van carrier, for example, a container is subject to all of the same impact forces as trucks. This includes sharp braking, obstacle-avoidance manoeuvres and driving on uneven ground. The latter occurs more frequently at cargo-handling operators than on public roads.
Containers are often set down so hard that the employed load securing device is highly stressed already prior to the actual sea transport.

Van carrier for container transport

Container delivery (pre-carriage)

The containers are delivered by road, rail or feeder vessel, etc., or loaded directly in the port. Loading directly on board the vessel is a very rare occurrence.

Container interchange

The condition of the empty container should be checked during delivery and return delivery of the loaded units. Any damage should be noted in writing on the interchange form.
On transfer to the next responsible person (e.g. truck driver), the driver is well-advised to check the container the same way and to report any damage if necessary.

If the container is accepted without prior inspection, it must be assumed in cases of doubt that the damage that was not recorded or went unnoticed at the time of taking delivery was caused at a later date by somebody else (in this case the driver).

This applies to all further transfers of the container to other persons within the transport chain. Almost all large container terminals inspect incoming and outgoing containers for damage. This inspection is sometimes carried out using video technology.

Badly managed container depot

For cost and time reasons, smaller container depots or shippers often ignore this measure.

This often has the consequence that damage caused within the transport chain cannot be traced back. Regress is therefore very difficult and those involved soon find themselves in a situation of disagreement.

Containers are often inspected only externally on taking delivery. Inspection of the interior is usually limited to opening the right container door and glancing into the container. Inspection of the container floor, which is important particularly for paper reels and pulp often does not take place.

Without sufficient lighting, this visual inspection is additionally difficult during the dark winter months.

In any event, shippers who pack containers at their own facility on their own responsibility should inspect the containers on receipt and document the same (see also page 84 Container check report).

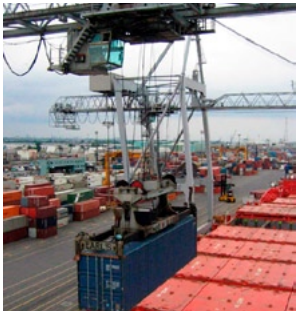
Bad illumination of container

The forwarding agent or the customer ordering the container should verify whether the depot carries out the appropriate inspections and document these in the interchange form.

Sea transport

The loading of containers on seagoing vessels takes place for the most part with gantry cranes.

Due to the ever decreasing free time available at ocean terminals, the duration of container loading on board is an important time and cost factor. Stresses on the cargo in the container during unloading and loading have increased with the modernisation of gantry cranes and will continue to increase further.



Gantry crane

The stresses of sea transport pose a particular challenge to the safety of the cargo units and cargo securing measures.

Bad conditions at sea can have an effect similar to a truck braking sharply in normal traffic conditions.
The container is subjected to brief peak loads and repetitive stresses (e.g. rolling motions of the vessel), which can impact on the cargo for days.

Unsecured cargo

In a serious case, this means that with each rolling motion the cargo in the container can slide into the gaps between the cargo.

Container wall damaged by the cargo within

If the entire cargo „settles“, the existing voids can become one large cargo gap. This can cause the cargo to build up high kinetic energy. After a certain time, the container is no longer able to absorb these continuous forces and can be damaged completely under certain circumstances.

Subjected to these loads, the cargo such as paper in reels and paper in sheets is rendered unusable for processing much earlier on.

Container door damaged by cargo within

Subsequent container transport (on-carriage)

After pre-carriage and subsequent transport by sea, the container has normally not yet completed its journey. From the port of entry, the container must still be delivered to the receiver, who may take delivery of the container using other handling techniques and with a different understanding of the concept of suitable handling quality.

Unsuitable equipment

The customer should be aware of the means of transport to be used for container delivery.

General cargo vessel

General

General cargo vessels have become less frequent for shipments of forest products. The quality of the loading operations stands and falls with the experience, knowledge of the goods and customer awareness of all those involved. Should one of these requirements be unclear, loading operations can be jeopardised.

General cargo ship

Loading planning

For an efficient loading planning, the main parties involved (stevedore, ship owner, quay cargo-handling operator, forwarding agent, etc.) must agree on the type and volume of the load. All obstacles should be discussed realistically in advance and solutions should be found. This already begins with bad weather conditions...

Poor stowage in general cargo vessel

...and by no means ends with quantity and unit dimension variations. Overloading, cargo securing and the choice of cargo-handling and loading equipment are the main problems.

Wet cargo hold

In order to avoid these problems, the parties can agree on a standard check list for advance clarification of the most important issues (sample check list, see annex).

Uneven floor in the hold

Loading

When all issues on the check list have been clarified, practical realisation (at least for initial loading operations) should be carried out locally in the presence of a competent representative of each of the companies involved. The most frequently occurring problems are listed in brief below:

Antwerp clamp

- The cargo has not yet been delivered in full.
- Contrary to prior agreement, the terminal or

vessel owners do not allow the operation to be photographed.
- The planned stowage locations do not comply with the requirements.
- The cargo hold is not swept properly.
- Cargo residues are present in the hatch frame.
- Large amounts of water fall into the hatch when the cargo hatches are opened.
- The hatches cannot be closed quickly enough when it starts to rain.
- Work continues in rain or snow contrary to agreement.
- The cargo is not stowed properly.
- Fork-lift drivers are inexperienced in handling the cargo.
- The cargo handling equipment is unsuitable for the product.
- The cargo is over-stowed with other cargo contrary to agreement.
- Contact partners are unavailable or do not have the necessary competence.

In so far that the conditions locally deviate considerably from the agreements, loading operations should be stopped until final clarification is provided.

Special vessels e.g. „box-shaped“

General

These vessels are usually clean and well-maintained. Loading normally takes place by personnel who are used to working together. Loading or unloading takes place on a routine manner, personnel are experienced.

Special vessel

It may be necessary to clarify in advance under which weather conditions loading operations must be stopped. Owing to the pressure of time and cost involved in loading and unloading a vessel, representatives sometimes have differences of opinion.

Stowage in the rectangular (box-shaped) cargo hold

Note

Even with special vessels, with suitable equipment and parties who are experienced with the loading and unloading operation, the following cases should call for greater attention:

- This is an initial loading operation.
- The type, dimensions, etc. of the cargo changes considerably.
- Another partner (stevedore, quay cargo-handling operator) is used.

Attention must also be given to loading and unloading in the port of arrival.

Side port ship

Side port ship

General

The type of ship „side port ship“ also known as „elevator ship“ can also be easily dispatched in the

same way as the special „box-shaped“ ship. These vessels are often provided with their own lift truck in the cargo hatch.
An electric lift truck takes its power directly from the ship‘s power supply. The lift truck places the paper reels on a conveyor belt on one of the tween decks.

Fork-lift truck on board

This transports the reels to the elevator, which transports the reels upwards. From this point, the reels are transported ashore with a further conveyor belt, where they are removed with clamp trucks.

Handover to landbased vehicle

Note

Prior to using the ship‘s own lift truck, it must be ensured that the pressure of the paper clamps is correctly adjusted. It is possible that individual slats of the conveying equipment of the elevator system are faulty. This can damage the ends of the reels. A random check is recommended.
As the reels are removed onshore by clamp trucks, it must be ensured that:

Cable duct restricts working area

- The trucks are able to reach the paper reels unhindered by surface unevenness (rails, cable ducts and rails of the quay cranes, etc.).
- For elevator operation, the vessel is located close enough to the quay wall (check fender dimensions) so that the trucks are able to pick up the reels unhindered.

Gap between vessel and quayside

Barge

Barge

General

In the original sense, a barge is an unpowered floating vessel (lighter) that is intended to be pushed or towed. The English term „barge“ is also used in the German language for various means of transport. These include:

- Commonly an unpowered lighter intended to be pushed or towed.
- Lash barge; for sea transport, this vessel is taken over completely by the mother ship and subsequently transports the cargo in shallow waters to the final port of destination.

- Inland waterway vessel, e.g. for transports on the river Rhine.
- Occasionally the motor coaster.

Note

For loading a barge in the conventional way, it must be ensured that:

- The cargo holds are clean, dry and free of smell (see also page 58, Transport requirements).
- There are no cargo residues in the frames and hatch frames.
- No paint or rust particles are removed from the walls of the vessel during loading/unloading. This applies in particular to the loading of pulp.
- The floor of the hold is not uneven and deformed. This applies in particular to the horizontal transport of paper reels.

Cargo residues on pulp bales

- The securing of cargo, particularly in the case of lash barges takes place according to the requirements for seagoing vessels.

Particularly with older motor coasters, it can happen that the hatch covers no longer provide an efficient seal. Entering sea water can quickly damage the cargo. The hatch covers may have to be sealed by additional measures.

RoRo vessel

RoRo vessel

General

RoRo vessels are normally loaded via a stern ramp at the rear. The cargo, construction and special vehicles for example, are transported into the ship under their own power. Paper and pulp are usually brought on board on so-called roll trailers.

Loading via the stern ramp

Roll trailer

Roll trailers are usually unsprung trailers that are transported by means of a special towing vehicle.

Roll trailer

They are often referred to as MAFI trailers or called MAFI (derived from the manufacturer name of the towing vehicle „MAFI Transport-Systeme GmbH“).
The trailers are loaded prior to the arrival of the vessel. Special attention must be paid to the securing of cargo, as RoRo vessels with their cargo of trailers navigate all shipping routes.

The cargo is therefore secured with the utmost care by the shippers.

Prior to loading on board the trailers are checked again and the cargo is additionally secured if necessary.
On board the ship the loaded trailers are secured aditionally to prevent any shifting of the cargo. In the event of damage to the trailer tyres, these can flap around during transport in the terminal. This can damage the cargo under certain circumstances. The cargo securing measures may have to be rechecked due to settling of the cargo.

Note

It must be ensured that the cargo (paper in reels or palletised paper in sheets) is not damaged due to incorrect securing of the cargo.
It often happens that the cargo is only secured by lashing down. Parts of the cargo are secured with textile straps and a ratchet system. Depending on the type of ratchet system used, considerable forces are exerted on the cargo. These forces concentrate on the edges of the reels or format of the paper stack. Depending on the tightening force, this can lead to the cargo being damaged.
Generously dimensioned edge protectors distribute the forces evenly over the cargo and protect the edges.

Edge protector

The use of self-made edge protectors of nailed strips of wood is not recommended, as these are unable to withstand the applied forces over long periods of time.

Strips of wood as edge protectors

Sometimes, so-called cargo securing tarpaulins are also used. Those familiar with this system know the good results achieved in the securing of cargo.
Cargo securing tarpaulins have been claimed to damage the edges of the cargo. However, this is due to incorrect use of the tarpaulins.

Cargo securing tarpaulins

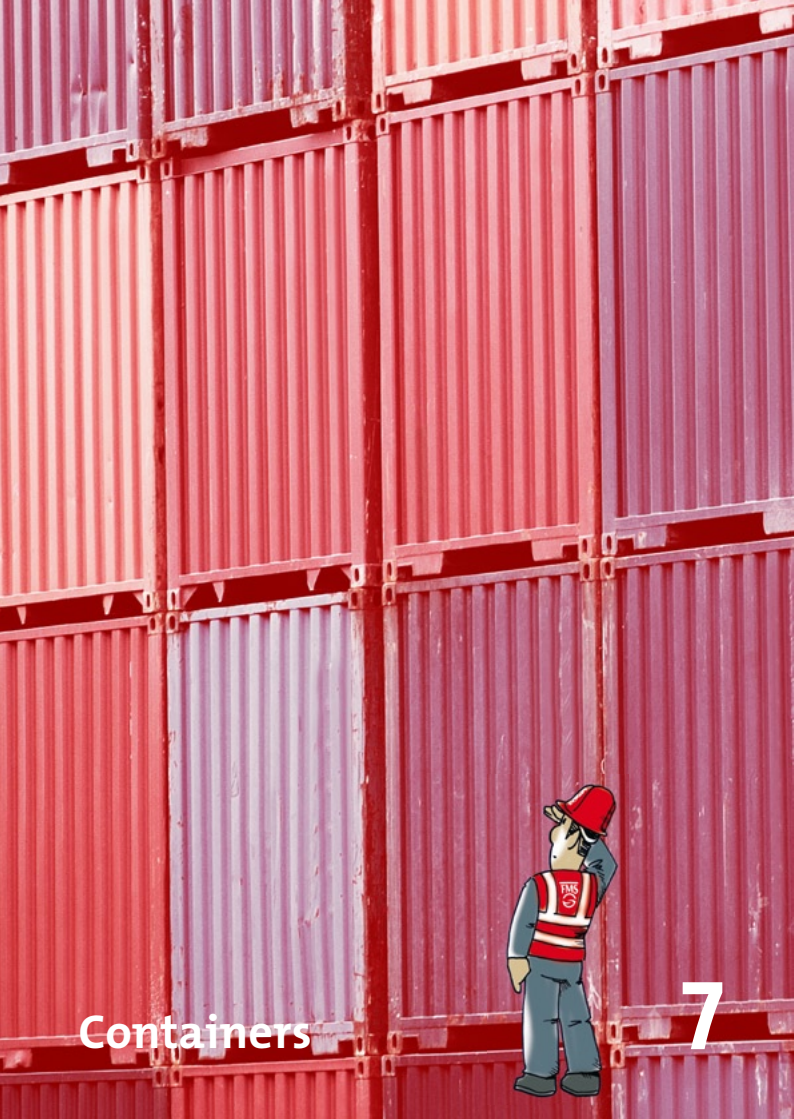
As cargo securing tarpaulins are expensive, they are mostly only worth using if their return is guaranteed.
For securing trailers on seagoing vessels, it must be ensured that the sling chains are attached only to the points on the trailer provided for this purpose.
Under no circumstances must chains be tightened over the cargo.

Bolsters

Loading paper on bolsters is not as common an operation as loading on roll trailers. The requirements for loading on roll trailers (see Chapter 6, page 73, Roll trailers) apply also to bolsters.

When prestowed and on board the vessel, the bolsters are partly stacked one on top of each other. This means that the fully loaded bolster support rests on the ends of the paper reels on the bolster located below. Damage to the edges or dents in the ends of the paper reels are unavoidable without additional securing measures. This stowage method is only permissible when there is absolutely no doubt that the cargo will not be damaged also in heavy seas.

Stacked bolsters



Containers

7

Containers

The first containers made their spectacular and what would prove to be unstoppable debut in the world of transport in 1966. Since then, their number has increased rapidly with substantial growth being recorded every year.
Their effects on the loading of forest products vary. Although containers intitially seemed to offer unlimited advantages, it has since become increasingly difficult to organize smooth container transport in many cases. The wrapping of the cargo units has continuously been optimised and can barely manage to meet the demands and improvements of the modern carriers of today.
The sizes of the units are largely customer-orientated. Homogeneous cargos as a simple basis for form and friction-locking stowage are becoming less and less common.

Meanwhile, paper reels are now more commonly produced in sizes and weights which are not in harmony with container dimensions.

„Jumbo" reels in container

General

Transporting paper in containers means that these must be suitable for this purpose. That is:

- Clean
- Dry
- Free of smell

The actual container check begins from the outside.
(A standard check list is provided at the end of this chapter.)
Strictly speaking, it begins when the container is ordered. It is important to state precisely for which kind of cargo the container is intended to be used.
Some companies assume that modern reel packaging is resistant to oil, dirt and water. This assumption may hold for palletized paper. which does not come into contact with the container floor. Whether a soiled container can be loaded is for the owner or forwarding agent responsible for loading to decide. This decision should be made free of commercial pressure and solely for the benefit of the cargo.

It is a fact that not all containers in international circulation are brand new. Containers are often used although their condition is doubtful. They do not give reason for outright rejection, but they also cannot be definitely classified as suitable for cargo use. This condition is seen as a „grey area". In order to better describe the boundary between usability and unsuitability, from page 86 following the check list, a positive and a negative example are provided for virtually every component. Every container must be inspected for foreign bodies prior to loading. These are not only loose objects such as wood splinters, stones, etc., but also ingrained cargo residues such as plastic granulate.

Soiled container floor

Particularly dangerous are hidden defects: Bolted container floor joints can often be defective or a repair could have been carried out incorrectly.

The container floor can bend after loading the cargo. A screw protruding from the plywood floor may penetrate the end of the paper reel.

Cargo residues in container

Protruding floor screws

CONTAINER CHECK REPORT

Container no.:	_____	Gross weight kg:	_____
Type:	_____	Tara kg:	_____
Year of construction:	_____	CSC / ACEP:	yes no

Door side
- Door header ☐
- Door sill ☐
- Data sign-board ☐

Left door
- Corner post ☐
- Hinges ☐
- Locking bar ☐
- Door handle ☐
- Door handle retainer ☐
- Door gasket ☐
- Interior ☐

Left side
- Top side rail ☐
- Bottom side rail ☐
- Fork lift pockets ☐
- Side panel, outside ☐
- Side panel, inside ☐

Front
- Front header ☐
- Front sill ☐
- Left corner post ☐
- Right corner post ☐
- Front panel, outside ☐
- Front panel, inside ☐

Roof
- Vertical frame ☐
- Roof outside ☐
- Roof inside ☐
- Lashing fittings ☐

Floor
- Crossmember ☐
- Plywood floor ☐
- Threshold plate ☐
- Lashing fittings ☐

Right door

- Corner post ☐
- Hinges ☐
- Locking bar ☐
- Door handle ☐
- Door handle retainer ☐
- Door gasket ☐
- Interior ☐

Right side

- Top side rail ☐
- Bottom side rail ☐
- Fork lift pockets ☐
- Side panel, outside ☐
- Side panel, inside ☐

Type of damages

A = Crack	D = Missing	G = Dent	K = Wet
B = Hole	E = Broken	H = Scratch	L = Odor
C = Loose	F = Twisted	J = Rust	M = Contaminated

Remark:

_____

_____

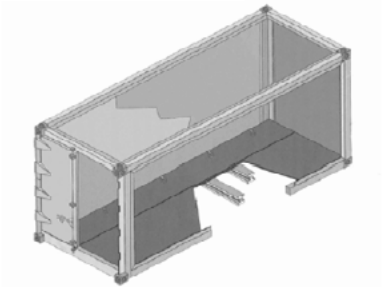
Date:

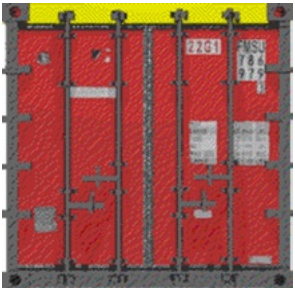
Signature driver:

_____

Signature employee:

_____





Designation:

- Door header

Further designations:

- Top cross member
- Roof frame
- Roof cross member
- Upper member
- Door support

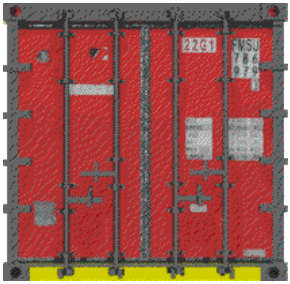
Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- Bent
- ♦ *Dent*
- Scratch
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



Condition: Satisfactory

Designation:

- Door sill

Further designations:

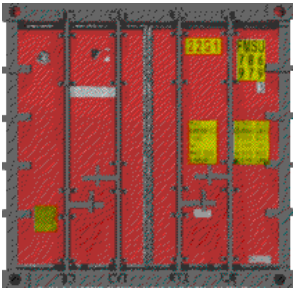
- Bottom cross member
- Floor frame
- Floor cross member
- Lower member

Possible damage:

Condition: Unsatisfactory

- ♦ *Crack*
- Hole
- Loose
- Break
- Bent
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



Condition: Satisfactory

Condition: Unsatisfactory

Designation:

- Data sign-board

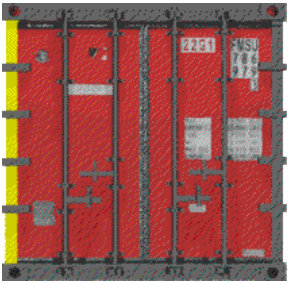
Further designations:

- CSC plate
- Customs plate
- TCT plate
- Owner and manufacturer's plate

Possible damage:

- Hole
- ♦ *Missing*
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



Designation:

- Door corner post
  (with j-bar)

Further designations:

- Door post
- Corner post

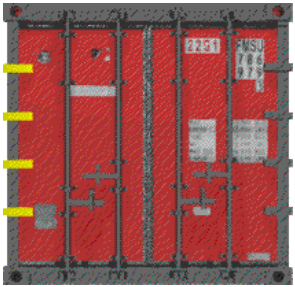
Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



Designation:

- Hinges

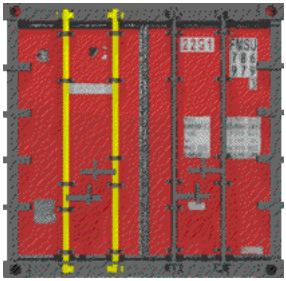
Condition: Satisfactory

Possible damage:

- Crack
- Hole
- ♦ *Loose*
- Break
- Bent
- Dent
- Scratch
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



Designation:

- Locking bar
  (with locking cam)

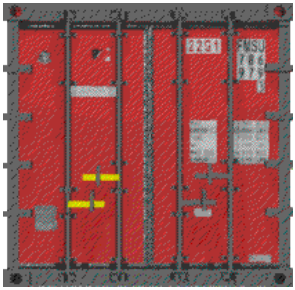
Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Condition: Unsatisfactory



Designation:

- Door handle

Further designations:

- Linkage handle
- Linkage lever

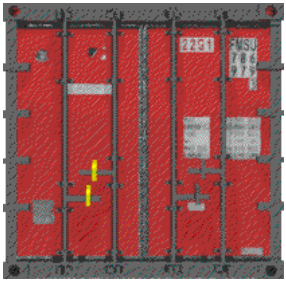
Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



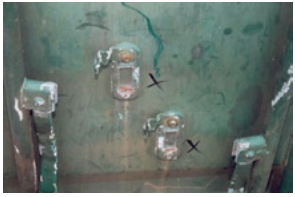
Designation:

- Door handle retainer (with door handle catch)

Condition: Satisfactory

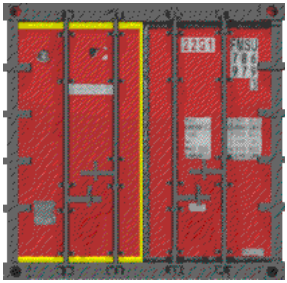
Possible damage:

- Crack
- Hole
- Loose
- ♦ *Break*
- Bent
- Dent
- Scratch
- Rust



Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.



Designation:

- Door gasket

Further designations:

- Rubber gasket
- Gasket

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- ♦ *Loose*
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Door

Condition: Satisfactory

Possible damage:

- Loose
- Missing
- Scratch
- ♦ *Bent*
- Rust
- Hole

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Top side rail

Further designations:

- Upper member
- Roof rail
- Roof frame

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Bottom side rail

Further designations:

- Bottom cross member
- Bottom rail

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Fork lift pockets

Condition: Satisfactory

Condition: Unsatisfatory

Possible damage:

- ♦ *Crack*
- Hole
- Loose
- Break
- Bent
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Side panel, outside

Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- Bent
- ♦ *Dent*
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Side panel, inside

Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- ♦ *Hole*
- Loose
- Break
- Bent
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Condition: Satisfactory

Condition: Unsatisfactory

Designation:

- Front header

Further designations:

- Top cross member
- Roof frame
- Roof rail
- Upper member

Possible damage:

- Crack
- Hole
- Loose
- Break
- Bent
- ♦ *Dent*
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Front sill

Further designations:

- Bottom frame
- Bottom rail
- Bottom cross member

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- ♦ *Break*
- Bent
- Dent
- Scratch
- Rust

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Front corner post

Further designations:

- Front corner column
- Corner column

Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

• Front panel, outside

Further designations:

• End panel

Condition: Satisfactory

Possible damage:

• Crack
• Hole
• Loose
• Break
• Bent
♦ *Dent*
• Scratch
• Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Condition: Unsatisfactory

Designation:

- Front panel, inside

Further designations:

- End panel

Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- Bent
- ♦ *Dent*
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Roof, outside

Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- Hole
- Loose
- Bent
- ♦ *Dent*
- Scratch
- Rust
- Fouled

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Roof, inside

Condition: Satisfactory

Condition: Unsatisfactory

Possible damage:

- Crack
- Hole
- Loose
- Bent
- Dent
- Scratch
- ♦ *Rust*

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Lashing fittings

Further designations:

- Lashing rings
- Top lashing points
- Top lashing shackles
- Top lashing eyes

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- ♦ *Break*
- Bent
- Dent
- Scratch
- Rust

Condition: Unsatisatory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Cross member

Further designations:

- Bottom rail
- Rail

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Break
- ♦ *Bent*
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Condition: Unsatisfactory

Designation:

- Plywood floor

Further designations:

- Floor
- Floor section

Condition: Satisfactory

Possible damage:

- Crack
- ♦ *Hole*
- Loose
- Missing
- Bent
- Dent
- Scratch
- Rust

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Condition: Unsatisfactory

Designation:

- Threshold plate

Further designations:

- Door plate
- Inner plate
- Door threshold plate

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Bent
- Dent
- Scratch

♦ *Rust*

Condition: Unsatisfactory

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Designation:

- Lashing fittings

Further designations:

- Bottom lashing rings
- Bottom lashing points
- Bottom lashing shackles
- Bottom lashing eyes

Condition: Satisfactory

Possible damage:

- Crack
- Hole
- Loose
- Bent
- Dent
- Scratch
- Rust

♦ *Missing*

The damage marked with ♦ corresponds to the unsatisfactory condition shown.

Condition: Unsatisfactory

Container dimensions

20‘ standard container

Container dimensions according to DIN/ISO 668

		Millimetre/mm	Feet/ft.
Internal	Length	5867	19‘3“
	Width	2330	7‘7 3/4“
	Height	2350	7‘8 1/2‘
Door opening	Width	2286	7‘6‘
	Height	2261	7‘5“

		Kilogram/kg	Pound/lbs
Weight	Max. gross weight	30480	67200
	Tare	2250	4960
	Cubic metres/cu m	28230	62240

	Cubic metres/cu m	Cubic feet/cu ft
Volume	33.2	1172

40‘ standard container

Container dimensions according to DIN/ISO 668

	Millimetre/mm		Feet/ft
Internal	Length	11998	39‘4 3/8“
	Width	2330	7‘7 3/4“
	Height	2350	7‘8 1/2“
Door opening	Width	2286	7‘6“
	Height	2261	7‘5“

		Kilogram/kg	Pound/lbs
Weight	Max. gross weight	30480	67200
	Tare	3780	8330
	Cubic metres/cu m	26700	58870

Volume	Cubic metres/cu m	Cubic feet/cu ft
	67.7	2390

40‘ high cube container

Container dimensions according to DIN/ISO 668

	Millimetre/mm		Feet/ft
Internal	Length	11998	39‘4 3/8“
	Width	2330	7‘7 3/4“
	Height	2655	8‘8 1/2‘
Door opening	Width	2286	7‘6“
	Height	2566	8‘5‘

		Kilogram/kg	Pound/lbs
Weight	Max. gross weight	30480	67200
	Tare	4020	8860
	Cubic metres/cu m	26460	58340

Volume	Cubic metres/cu m	Cubic feet/cu ft
	76.3	2694

20‘ open top container

Example: Hapag Lloyd

		Millimetre/mm	Feet/ft
Internal	Length	5897	19‘ 4 1/8“
	Width	2350	7‘ 8 1/2“
	Height	2377	7‘ 9 1/2“
Door opening	Width	2338	7‘ 8“
	Length	2280	7‘ 5 3/4“
Roof opening	Width	2230	7‘ 3 3/4“
	Length	5439	17‘ 10 1/8“

		Kilogram/kg	Pound/lbs
Weight	Max. gross weight	30480	67200
	Tare	2350	5180
	Cubic metres/cu m	28130	62020
Volume	Cubic metres/cu m	Cubic feet / cu ft	
	32.5	1149	

40‘ Open Top-Container

Example: Hapag Lloyd

		Millimetre/mm	Feet/ft
Internal	Length	12030	39‘ 5 5/8“
	Width	2350	7‘ 8 1/2“
	Height	2377	7‘ 9 1/2“
Door opening	Width	2338	7‘ 8“
	Length	2292	7‘ 6 1/4“
Roof opening	Width	2210	7‘ 3“
	Length	11573	37‘ 11 5/8“

		Kilogram/kg	Pound/lbs
Weight	Max. gross weight	30480	67200
	Tare	3850	8490
	Cubic metres/cu m	26630	58708

	Cubic metres/cu m	Cubic feet / cu ft
Volume	66.4	2345

Cargo units

8

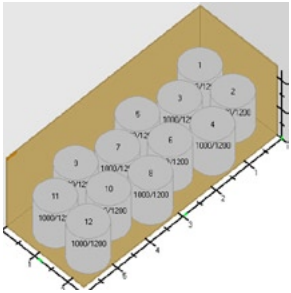
Cargo units

Reels

General

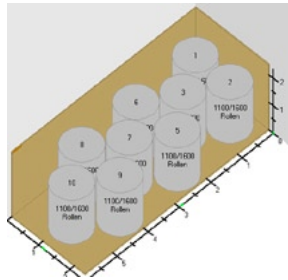
Paper reels can be loaded in various ways:

- Vertical loading (eye to sky), winding axis parallel to vehicle height.

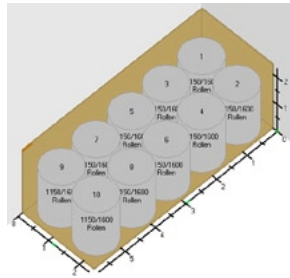


Winding axis parallel to vehicle height

The reels can be staggered (nested) or placed directly one in front of the other (soldier stack).

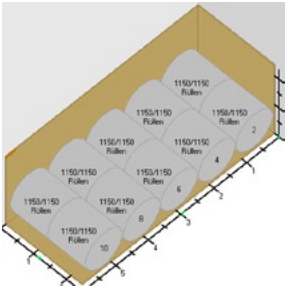


Nested



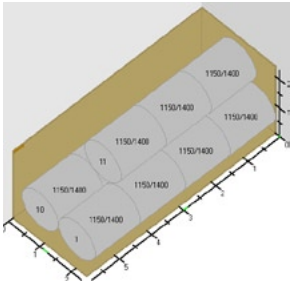
Soldier stack

- Horizontal loading (in rolling direction), winding axis parallel to vehicle width.



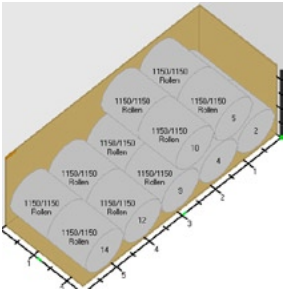
Winding axis parallel to vehicle width

- Horizontal loading (transverse to rolling direction), winding axis parallel to vehicle length.



Winding axis parallel to vehicle length

Where horizontal reels are stacked, they are usually arranged in pyramid form.



Pyramid form

The quality of paper handling stands or falls with the suitability of the equipment for correct handling. The majority of customers already have a requirement profile for handling their paper reels and this should be obtained in advance.

It is recommended to inform the cargo-handling partner of the expected cargo.

- How will the reels arrive?
  - -Loading/unloading from the rear of the truck
  - -Loading/unloading from the side of the truck
- What are the reel dimensions?
  - -Width (height)
  - -Diameter
  - -Weight
- Will the delivery include double reels (two reels in one package)?
- What quantities are expected?
- How are the reels packed (kraft paper, foil, etc.)?
- What information do reel labels or other data media contain?
- Is there a description of the data media?

- What is the maximum stacking height?
- What is the recommended clamp pressure?
- Are the manufacturer's loading instructions provided?

IFRA-Code

The reel number is generally made up as follows:	
Numbers 1 to 8: Reel number	
Scandinavian manufacturer:	Central European manufacturer:
No. 1: Paper machine number Nos. 2 and 3: Week of manufacture Nos. 4 to 8: 5-digit reel-spool number Nos. 00001 to 49999 in even years Nos. 50000 to 99999 in odd years	No. 1: Paper machine number Nos. 2 and 3: Week of manufacture Nos. 4 to 6: 3-digit reel-spool number Nos. 001 to 499 in even years Nos. 500 to 999 in odd years No. 7: Reel-spool batch No. 8: Reel position in reel-spool
Nos. 9 to 12: Reel weight Nos. 9 to 12 indicate gross reel weight	
No. 13: Type of packaging and manufacturer's code	

Type of packaging:
If number 13 is an odd number (1, 3, 5 or 7): 1 reel packed.
If number 13 is an even (2, 4, 6 or 8): 2 reels packed together.
Manufacturer's code:
Number 13 = 1 or 2: former code

Number 13 = 3 or 4 / 5 or 6 / 7 or 8 > new code

No. 14: Basis weight and quality	Std. => Standard Impr. => Improved
1 = Std. newsprint 40 g/m² 2 = Std. newsprint 45 g/m² 3 = Std. newsprint 48.8 g/m² 4 = Std. newsprint 52 g/m² 5 = Other standard newsprint	6 = Impr. newsprint 40 g/m² 7 = Impr. newsprint 48.8 g/m² 8 = Impr. newsprint 52 g/m² 9 = Impr. newsprint 55 g/m² 0 = Other types
Nos. 15 and 16: Manufacturer's code	

Meaning of barcode on reel label

Reel clamp

With the reel clamp, two arms with contact plates on opposite sides are placed against the sides of the reel. The arms are subsequently closed and the contact plates are pressed against the reel. The pressure exerted on the paper reel and the clamp plate coating are decisive for non-slip and efficient transport of the reel. The exact clamp pressure must be obtained from the paper manufacturer. Approximate guide values are provided in the table on page 212.

Rotation reel clamp

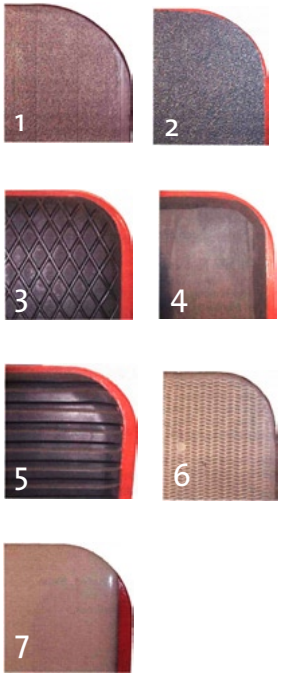


Plate coatings

1 Shot-blasted
2 Sand paper
3 Rubber (lozenge)
4 Rubber
5 Rubber (profiled)
6 Cast iron plate
7 Polyurethane

Electronic clamp pressure tester

If the clamp pressure is set too high, the reel is deformed.

If the clamp pressure is set too low, the reel can slip out of the clamp.

So-called „intelligent“ roll clamps adjust the pressure to the prevailing conditions (reel weight, work on uneven floor, etc.).

The clamp pressure must be measured when the hydraulic oil reaches operation temperature.

Low clamp pressure

The clamp pressure should be checked regularly for a correct setting. It is recommended to check and note the clamp pressure prior to each shift. Further checks are necessary if the attachment is used on various trucks. For checking the clamp pressure, stationary or mobile hydraulic or electronic test equipment can be used.
Clamp pressure reducing valves on the truck facilitate clamp pressure adjustment for handling paper reels with different weights.

Additional coloured indicator lights (column) that light up depending on the respective reducing stages, signal the responsible whether the reel is picked up with the correct pressure.

„Indicator light“

Head clamps

General

The head clamp is a type of lifting gear which is positioned on the end of the horizontal reel. When the clamp and its load is lifted it grips the load like a pair of scissors. The amount of pressure exerted by the contact plates depends on the reel weight.

Different types are available for various reel diameters. These can be varied within their specific operating range to individual reel diameters.

Head clamp

Antwerp clamp

The so-called „Antwerp clamp“ has a similar lifting action; however, it presses itself against the roll via guided pull chains.
The „Antwerp clamp“ is not suitable for handling jumbo reels. To increase the handling capacity, several clamps are attached in a row to a single girder or in two rows to the frame girder.

The girders are provided with holes. The clamps are positioned in the holes with shackles depending on the reel diameter.

Antwerp clamp

Note

The preconditions for smooth cargo handling using head clamps are as follows:

- The reel packaging is undamaged and tightly wrapped.
- The clamp positions in the holes are at an exact distance to the slots for loading and unloading.
- The heavy head clamp is placed slowly on the end of the paper reels.
- The clamp is positioned centric above the reel core.
- The load is initially lifted after complete release of the safety mechanism.
- The crane driver does not lift the cargo abruptly.
- The heavy contact plates of the Antwerp clamp are placed slowly on the ends of the reels after being released (and not thrown).
- The pull chain guide is positioned in the centre above the reel core and the reels are vertically suspended.

Frame girder

Antwerp clamp, off-centre

Excentric load

Vacuum clamp

Vacuum clamp

General

The vacuum clamp is designed in such a way that large „rubber cups“ can be positioned on the ends of the vertical reels. A vacuum is subsequently built up between the cup and reel, similar to a suction cup.

Note

So that the reels are suitable for vacuum use, they must be appropriately prepared for this method of handling. For this purpose, the packaging must be open in the area of the reel core.

An optical system signals the crane driver whether an appropriate working vacuum has built up at all reels. The vacuum cups, similar to the head clamp, must be positioned exactly above the reels.

Transport cage

Transport cage

General

The transport cage is often used where no special handling equipment is available.

Note

The transport cage must be clean and undamaged. Before lifting loads by crane, the safety chain must be attached to ensure that no reels can fall out of the cage.

Jensen sling

Jensen sling

General

The so-called „Jensen sling“ was previously used as handling equipment. The paper reels were stowed in blocks and a frame-rope winch combination was lowered above the reels. After releasing the locking mechanism, the sling was pulled tight and the rope winch system tightened around the reel block to lift the load.

Note

With reels increasing in size and number, this type of loading equipment is only rarely used.

Endless slings

Endless slings

General

Endless slings are used almost only for horizontal loading (pressing).

Note

So far as this type of loading method is still used today, the following must be ensured:

- It is clearly defined whether the straps remain attached to the reels or should be removed prior to shipment.
- The straps are clean, dry and free of oil, etc.
- The reels hang horizontally in the sling and are not placed above the reel edge.

Loading nets

Loading net

General

Loading nets were used earlier and are only mentioned here in order to show how the techniques, quality requirements and reel sizes have changed in the course of the years.

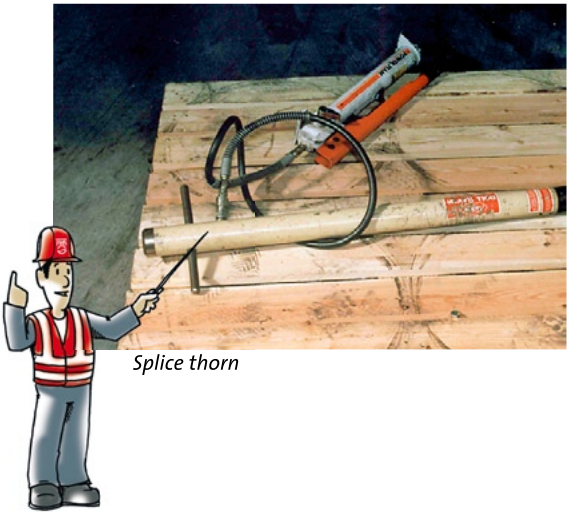
Splice thorn

General

The splice thorn was used in the past to restore crushed reel cores to their original state. A pin is inserted into the damaged reel core and spread within the core hydraulically, whereupon the circular shape of the core is largely restored. This is intended to enable easy mounting of the reels in the printing machine.

Note

The high quality requirements for processing paper reels no longer allow the use of this technology today.



Splice thorn

Reel handling

General

In the last decade, many conditions relating to reel handling have changed. Reel dimensions and weights have increased and the technology has changed despite original handling techniques still being largely employed today.
An essential difference is in the area of damage. If a paper reel slipped out of the clamp in the past, this could have meant a total loss of 300 kg. If a reel slips out of the clamp today, this could mean a total loss of up to 6000 kg and higher.
In this regard, the employed handling techniques must constantly be checked for safety with respect to the cargo and handling personnel.

Handling errors

Error:
Clamping at an angle.

Description:
Clamp plates not positioned vertically on reel body.

Possible cause:
Reel gripped with mast topped in or out.

Clamping at an angle

Clamping at an angle

Error:
Clamp insufficiently opened.

Description:
Outer edges of contact plates damage reel body.

Possible cause:
Clamp wrong or too small. Hectic and negligent handling.

Clamp insufficiently opened

Contact plate can damage reel

Error:
Off-centre clamping.

Description:
Gripping arms are obviously positioned in front of the imaginary centre of reel.

Possible cause:
Tight stowage on transport vehicle.
Unloading without corrective actions.

Off-centre clamping

Error:
Gripping over reel edges.

Description:
Contact plates grip part of an adjacent reel.

Possible cause:
Driver's field of view restricted due to truck mast.

Gripping over reel edges ...

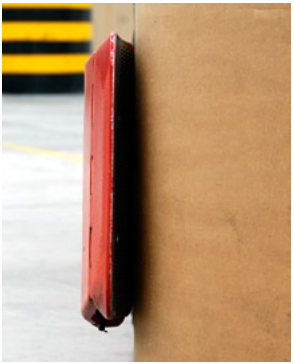
... is particularly dangerous in case of different reel diameters.

Error:
Contact plates not resting against reel.

Description:
Contact plates not form and force-locking.

Possible causes:
Incorrect position of clamp arms, clamps too small.

„Gap“ between contact plate and reel



Contact plate not resting fully against reel

Error:
Divided arm positioned too low.

Description:
Upper arm tears reel header open.

Possible cause:
Field of view of truck driver restricted.

Divided arm must be guided clearly above the reel

Arm lowered too far can tear off reel header

Error:
Lowering reel on rear edge.

Description:
Reel lowered on edge.

Possible causes:
Reel lowered with topped in mast.
No tilt indicator available.

Edge damage due to lowering at an angle

Lowering at the rear edge

Error:
Lowering reel on front edge

Description:
Lowering reel on edge.

Possible causes:
Reel lowered with topped out mast.
No tilt indicator available.

Edge damage due to lowering at an angle

Lowering at the front edge

Error:
Clamp not in zero degree position.

Description:
Gripping arms not vertical to reel.

Possible causes:
Restricted field of view of truck driver, no automatic reset to zero degree position.

Clamp not in zero degree position

Arms not vertical

Reels in containers

General

The container is increasingly replacing conventional loading methods. This „transport box“ offers the reels a certain amount of transport protection, but is often overrated in this function. Owing to the increasing handling loads, the container is often also overloaded. Insufficient securing of the cargo coupled with concentrated loads on panels typical of reel cargos, is one of the reasons for increasing container damage.

Notes

The following points must be observed when loading paper reels in containers:

- The container must be delivered to the shipper in a perfect condition (see also Chapter 7 Container check).
- Concentrated loads on the container walls and door sides due to the cargo must be avoided.
- It is possible that the bottom side rails protrude from the floor.

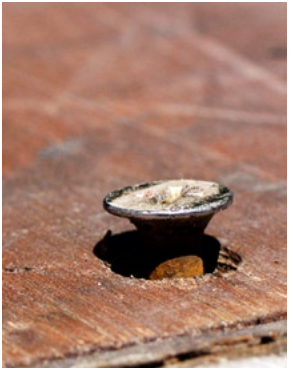
Damaged container front

Protruding bottom side rails

When reels are placed in the area of the corrugated container panels, there is a risk of the reel edges being crushed. In numerous cases, vertical cardboard is used as a spacer. To be taken into account in the calculation of the load is that the container can be restricted in its loading width. There is the possibility that not all the reels will fit in the container.

Vertical cardboard layers

If the container floor is damaged or has been incorrectly repaired, the screws can protrude from the floor. This is often not immediately visible to the shipper.



Protruding screw

Protruding screws damage the sensitive ends of reels and will cause total damage to the reel in conjunction with incorrect loading practices (pushing).

Damaged end of paper reel

Reel damage

Paper reels are loaded in different ways. The reels can be unwrapped (e.g. kraftliner), wrapped in paper (e.g. newsprint) or also in foil (e.g. cardboard).

The customer can expect to receive the paper reels in the same condition as purchased – undamaged.

The tolerance limits for all those involved within the transport chain vary. This has an increasing effect on correct handling procedures.

„Zero damage“ applies to paper reels. It is up to the owner of the product to decide whether he wants to tolerate any defects.

Any damage to the ends of the reels can result in considerable paper loss up to total loss. Damage in the form of crushed or torn paper in the outer area (edge damage) is not always immediately visible, but leads to considerable processing problems. It is even worse when this damage is only

noticed when the reels are opened at the printer.
The time where crushed reel cores were repaired using the splice pin should be a thing of the past. Today, even a slight ovality of the core makes the reel unusable.

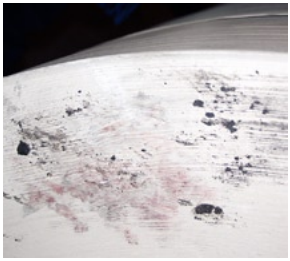
Total loss

Edge damage

Typical damage

Damage:
End fouled.

Description:
Foreign matter, oil, soot, etc., on cut surface.



Damaged paper reel end

Possible cause:
Unclean slot.

Note:
The damage is expressed in millimetres. Measured is the fouled area of the reel end. Measurement starts at the reel edge. Value 1 is the beginning, value 2 the end of the fouled area (measured from the reel edge towards the reel core). Within this area the wrap is damaged. Value 3 is the penetration depth of the fouling (damage to the web width).

Damage:
Moisture damage.

Description:
Moist paper, possible already swollen („elephant foot“).


Moisture damage

Possible causes:
Loading in rain, leaky truck tarpaulin, wet floor.

Note:
The extent of the damage is expressed in millimetres. Measurement takes place from the reel edge towards the reel core. The penetration depth of the moisture in the width of the paper web must be specified as far as possible.

Damage:
Side damage.

Description:
Damage to reel body.

Possible cause:
Clamp not sufficiently opened.

Damaged reel body

Note:
The extent of the edge damage is expressed in millimetres. Measurement takes place from the reel edge towards the reel core. Alternatively, the number of damaged paper layers must be counted.

Damage:
Edge damage (tear).

Description:
Damage to reel edge.

Edge damage

Possible cause:
„Slipping“ of the clamp whilst opening.

Note:
The extent of the edge damage is expressed in millimetres. Measurement takes place from the reel edge towards the reel core.

Damage:
Edge damage (crushing).

Description:
Deformation of reel edge.


Edge damage

Possible causes:
Setting down at an angle, „jumping“ of the clamp whilst opening.

Note:
The extent of the edge damage is expressed in millimetres. Measurement takes place from the reel edge towards the reel core.

Damage:
Out-of-roundness.

Description:
Deformation of reel.

Possible causes:
High clamp pressure, reel fallen out of clamp.

Spider measurement

Note:
Deviations are expressed in millimetres. The diameter or reel radius is taken as a basis for the deviation.

Damage:
Indent/tear in end.

Description:
Slight to deep indentation.

Possible causes:
Protruding screw in floor, stone, etc.

Damaged end of paper reel

Note:
The damage is expressed in millimetres. Measured is the damaged area of the reel end. Measurement starts at the reel edge. Value 1 is the beginning, value 2 the end of the damage (measured from the reel edge towards the reel core). Within this area, the wrap is damaged. Value 3 is the depth of damage (damage to the web width).

Damage:
Total damage.

Description:
Deformation of reel core.

Possible cause:
Reel fallen down.

Total loss

Note:
A slightly deformed core shows that the reel is no longer suitable for the originally intended purpose.

Paper in sheets

General

Cut paper sheets are stacked on pallets and packed, whereby the sheet dimensions are adapted to various customer requirements. It is almost impossible to stock the right pallet size for all paper sizes. This results in the pallet always being slightly larger than the stacked paper in sheets, termed pallet jut or projection. By contrast, if the pallet were smaller than the paper size, it would be termed pallet wing.
During transport, the pallet wing would ensure that the pallets are form and friction locked.

Pallet jut

When handling the pallets, the stack edges are quickly damaged however. For this reason the majority of cargo units have a slight pallet jut, which makes the form or friction lock loading more difficult.
Over the past years the packaging of such cargo units has been reduced drastically. Wooden covers are hardly used and the number of straps have been limited or are no longer used at all. This leaves room for interpretation whether the cargo unit can be considered as stable.

Pallet with paper in sheets with quintuple strapping

The pallet as a mean of transport is made mainly of wood. Pallets made of pressboard or with pressboard pallet feet are difficult to repair if damaged. Plastic pallets are only economical if inexpensive return delivery is ensured.
The type of construction decisively determines the strength of the pallet.

Pressboard pallet foot

- How is the pallet nailed?
- Is a transverse strip of wood nailed to the pallet feet?
- What are the dimensions of the individual strips of wood and feet?
- Is the wood free of knots and damage?
- Does the wood have the prescribed moisture content?
- Has the wood been pretreated against insect attack in accordance with the requirements (ISPM 15)?

When carrying out repairs, it should be ensured that the loading gauge and underclearance of the pallet are maintained, otherwise, compatibility for subsequent pallet rack warehouse storage is no longer ensured.

Handling equipment

The cargo units are picked up and transported with a suitable lift truck equipped with forks. Depending on the type of construction, one or more cargo units can be transported.

Four fork arm lift truck

Several pallets arranged one behind the other can be transported with long forks (e.g. truck unloading from the side). The four fork arm lift truck is able to pick up two pallets arranged side by side.

The fork should always be used taking into account the prescribed use and loading capacity limits. For manual transport by truck locally, hand pallet trucks are often used.

Handling

If the wrong lever is operated on a fork-lift truck, pallets will not fall out of the clamp like a paper reel; however, these can be seriously damaged.

A basic precondition for correct handling is the observance of the recommendation of the trade association.

Error:
Cargo units are pierced.

Pierced cargo unit

Description:
Fork tip damages adjacent pallet during stowage.

Possible cause:
Pallete not placed correctly on fork prior to stowage.

Protruding fork tip penetrates adjacent cargo unit

Error:
Parallel lifting of pallets.

Double pallet lifting

Description:
Each pallet is only lifted by one fork (the use of a four fork arm lift truck is necessary).

Possible cause:
Incorrect equipment.

One-sided load of paper stack

Error:
Pallets transported unsecured one above the other.

Description:
A pallet is unsecured on top of another cargo unit.

Possible causes:
Ignorance, non-observance of accident prevention regulations.

Pallets on top of each other

Danger of tilting if truck has to brake sharply

Error:
Pallets transported one behind the other.


Pallets one behind the other

Description:
Fork does not hold all cargo units completely.

Possible cause:
Forks unsuitable and too short.


Pallet feet threaten to break off during transport

Error:
Fork tip too high.


Fork tip too high

Description:
The fork tip damages the pallet board and/or paper stack.

Possible cause:
Field of view restricted due to truck mast.


Packaging pierced, damage to paper stack

Error:
Cargo units transported on fork tip.

Transport on fork tip

Description:
Cargo unit does not sit close to the fork back.

Possible causes:
Pallets difficult to reach on truck, driver did not rearrange the cargo after lifting.

Cargo unit can tilt

Error:
Mast topped out, fork too low, foot breaks off.

Mast titled, foot breaks off

Description:
Cargo unit stands on tilted fork. Fork too low above ground.

Possible cause:
Fork mast not returned to transport position.

Pallet feet threaten to break off

Error:
Pallet feet damaged by fork.

Description:
Fork damages or distorts pallet feet.

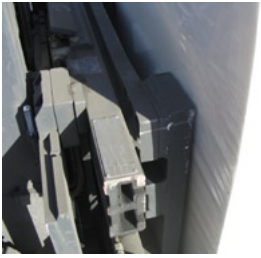
Possible causes:
Fork not positioned correctly under pallet, restricted field of view due to mast.

Pallet foot damaged by fork

The nails of the pallet foot can tear out

Error:
Back of fork presses against paper stack.

Description:
Back of fork perforates packaging and damages paper stack.



Back of fork presses against paper stack...

Possible cause:
Fork moved brashly under pallet with topped out mast.

... and perforates the wrapping

Error:
Pushing pallet into position.

Description:
The cargo unit is pushed on one side by the fork tip and pushed into position.

Pushing the pallet into position

Possible causes:
Lack of suitable equipment (e.g. fork with lateral arms), confined space conditions for stowage.

Pallet foot is damaged

Paper in sheets in containers

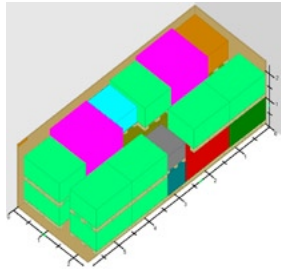
Customer requirements related to paper formats do not necessarily harmonize/ enable proper stowage in the container without gaps.
Even when all stowage combinations are taken into account, cargo gaps cannot always be avoided.

There is no precise definition of a cargo gap. The width of a hand is often used as a maximum size. Whether the hand is supposed to be held vertically or horizontally or horizontally with the fingers spread is unclear.

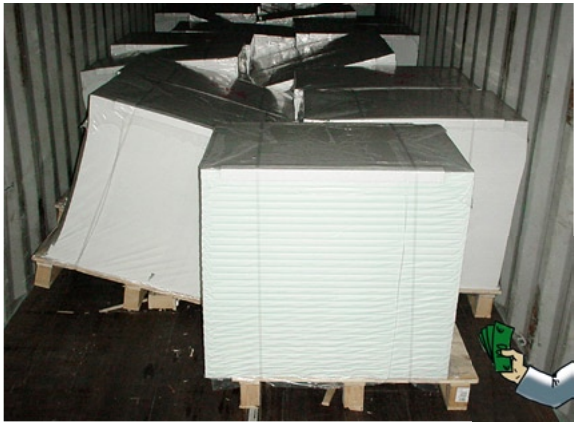
Unsecured cargo gap

It has shown in the past that stacked paper in sheets tilts or moves within the smallest cargo gap. This situation does not need to arise in all transport situations; only when maximum impacts are exerted (sharp braking of a truck, shunting impact of railway wagons, bad weather at sea).

Palletised paper in sheets must therefore be loaded from and force-locked. In order to achieve this objective, computer programs for cargo space optimisation as well as numerous cargo securing devices are available.



Stowage plan



Destroyed cargo units due to cargo gaps

Damage

A basic precondition for processing paper in sheets without problems is that the cargo unit is delivered undamaged. Internal transport in the pallet rack warehouse or manipulation with the pallet turner place high demands on the quality of handling. Damaged, moist paper with swollen edges or excessively dry paper sheets can result in the customer justifiably refusing to take delivery. Any changes to the cargo unit that would be made, e.g. due to a repair measure, must be agreed upon with the seller of the product in advance.

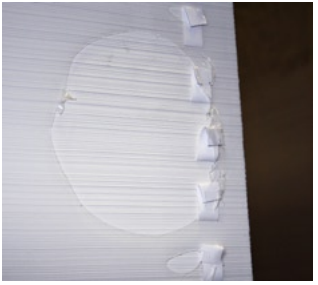
Damaged pallet foot

Typical damage

Error:
Holes in shrink wrapping.

Description:
One or more „hand size“ holes in shrink wrapping.

Possible causes:
Problems in the wrapping unit, shrink temperature too high.



Holes in shrink wrapping

Note:
It is easy for dirt and moisture to enter the paper stack through these holes.

Error:
Tears in shrink wrapping.

Description:
Foil partially compressed like a concertina.

Possible cause:
Contact to protruding objects during stowage.

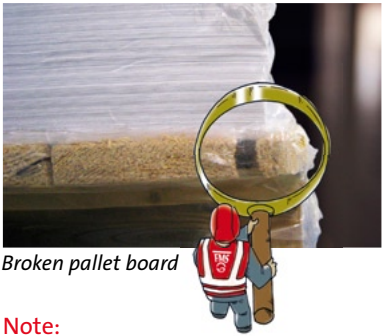
Torn wrapping

Note:
Metal strapping often jams during stowage and tears the wrapping.

Error:
Pallet boards broken.

Description:
Pallet boards are broken with the grain.

Possible cause:
Strapping pulls the boards upwards.



Broken pallet board

Note:
This damage is caused by a combination of highly pre-stressed strappings and the jut of the pallet boards.

Error:
Splintered pallet boards.

Description:
Pallet boards knocked off.

Possible cause:
Hard contact with fork tip.

Splintered pallet board

Note:
See also page 166

Pulp in bales

Pulp is one of the main components in paper production. The individual pulp sheets are stacked and bundled with metal wire as wrapped or unwrapped bales. Several of these bales, normally six to eight, are combined to a „unit“ and similarly bound with metal wire. A table of standard dimensions is provided at the end of chapter on page 187. Particular dangers are humidity, soiling and foreign substances. Foreign plastic material can cause considerable problems during processing. Important to ensure is that the pulp is not exposed to strong smells such as fish meal, etc., during storage. The smell can penetrate through to the final product paper. The high absorbency of the pulp encourages smell absorption in the same way as moisture absorption. With excessive humidity, the pulp can swell. Water-soluble impurities in the pulp can also damage the product.

Pulp in bales

Any contamination of pulp must therefore be avoided. All transport vehicles must be absolutely clean, dry and free of smell.

Handling equipment

The pulp units are either clamped (e.g. truck or container loading or unloading) or lifted directly by the strapping wires (ship loading or unloading). Pulp clamps can be compared to paper reel clamps.

Badly clamped pulp units

The units are clamped on the opposite narrow sides. The contact plates are moved parallel and pressed against the unit.

Before lifting the units, the sling hooks must be placed underneath the strapping wires manually and must be manually removed again after the landing of the unit. Automatic pneumatic systems that control the opening of the sling hooks are often used instead.

Sling hook (manual)

Semiautomatic frame rail for pulp

Clamps

When using clamps, it must be ensured that the units do not „sag“ in the clamp. The units become unstable, deform and can slip down to the ground.

When using pulp lift trucks, it must be ensured that no persons are located in the operating area of the truck.

Restricted field of view ...

After lifting the unit, the driver‘s field of view may be restricted.
Owing to tight stowage or a lack of suitable equipment, the operators occasionally move the fork tips underneath the strapping wires to lift the unit. This may cause broken wires due to the sharp edges of the fork tips.

... unsuitable lifting with fork tip

The units must only be lifted with a minimum of two sling hooks attached to the strapping wires.

When the sling is moved along the hold walls, it must be ensured that no rust or paint particles fall on to the units.

Foreign objects can sometimes fall unnoticed into the „pockets“ of the bale wrapping.
It can also happen that the large metal girder with suspended load knocks against the hold wall.

Foreign matter in bale wrapping

Rust and paint particles can consequently loosen.

Pulp bales in containers

Apart from standard checks each container ought to be free from any fouling or other contamination prior to loading pulp.

Plastic granulate on or between floor joints.

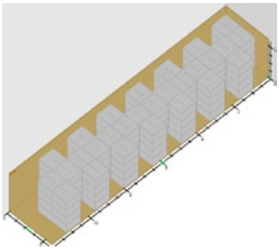
Foreign substances, particularly plastic granulate must be removed thoroughly without residues, otherwise the pulp may get penetrated/contaminated.

Sweeping the container is insufficient. The entire interior of the container must be thoroughly checked in good lighting conditions.
The dimensions of the units do not always harmonise with the internal dimensions of the container, i.e. the units must sometimes be forced into the container. This can damage the container and the receiver is faced with the problem of unloading these units again.

Stowage too tight

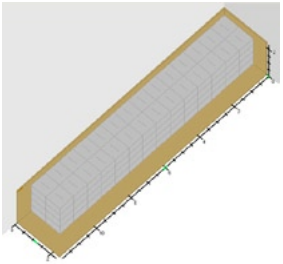
Contrary when a large number of unsecured cargo gaps are produced during loading this can cause the cargo to slide into these gaps if impact forces are exerted.

Simple „staggered“ stowage is insufficient.



Staggered stowage

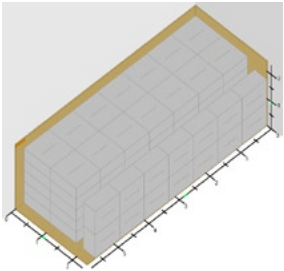
With new containers in particular, the varnished floors are very slippery so that there is virtually no friction between the transport vehicle and cargo. When the truck takes several bends and curves or the cargo is subjected to rolling motions at sea, the cargo shifts in a line.



Cargo block

Such a cargo block can build up considerable kinetic energy, which is sufficient to substantially reduce the vehicle stability or overturn the semitrailer and tractor.

Where individual units are opened for container loading, the cargo gaps can be filled with individual bales and therefore reduced.
Loading should be discussed in advance with all persons involved in the transport, because any change of such stuffing arrangement may result in less efficiency when unloading the container. Single bales cannot be handled and stored effectively.



Loading arrangement using individual bales

Damage

Damage to pulp is not as complex as damage to paper reels or paper in sheets.
Any contamination is to be regarded as damage.

During inspections, special attention must be paid to residues in the pockets of the packaging. The bales including packaging are processed for the most part.
In the case of moisture damage, the term „sea water damage“ is generally used. This is basically „salt water damage“. With salt water damage, the salt concentration can be 2000 mg/sqm or more. Salt deposits from the saline air in the ship‘s hold have a concentration of only 5 mg/sqm to 100 mg/sqm.

Dirty wrapping

Broken strapping wires must be replaced with wires of the same quality as far as possible. The same system strength as the original strapping must be ensured in any event.

Plastic straps must not be used for pulp.

Broken strapping wires...

...and damaged wrapping

Waste paper

Waste paper is loaded in wired units similar to pulp. In the course of time, the mills have increasingly specialised in their products. There are occasional problems when waste paper is handled without the necessary experience. Incoming quality inspections are therefore also delegated to handling partners. Under these circumstances, it should be examined whether the delivered goods have the specified quality. Waste paper is classified in light grades (from print and press products, office papers, files and folders) and dark grades (from packaging material). The bale weight and moisture content are criteria for quality measurement.

Handling equipment

Waste paper bales are handled with the same bale clamps as those used for pulp.

Bale-lift truck unloading waste paper bales

For handling purposes, the waste paper bales must not be lifted by the bale strapping.
Further equipment includes a calibrated scale and suitable moisture measuring device for the incoming inspection.

Handling

When handling waste paper bales, it must be ensured that these are not prime pulp units of the same type and size. There is a high risk that not all undesired objects are detected during sorting. It is therefore possible that objects such as used syringes, containers with unknown liquids, etc., are present in the pressed bales.

Foreign matters in waste paper

These can injure loading personnel. When handling waste paper, it can happen that individual pressed layers become detached from the bale respectively bales fall apart. Working areas, especially free areas exposed to winds, may become extremely dirty. Suitable sweeping machines should be available in this case.

When loading trucks, it must be ensured that protruding wire strapping does not damage the truck tarpaulins.

Dirty warehouse

1 bale = 170 - 250 kg

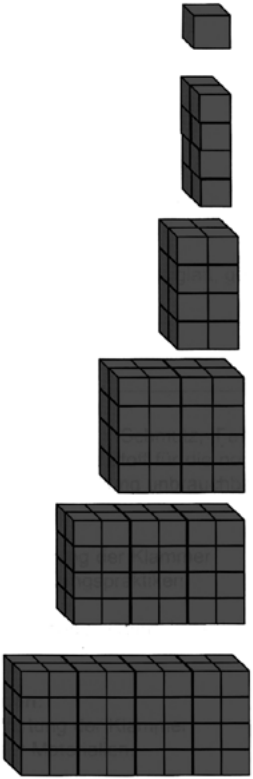
8 bales = 1 unit =
1360 - 2000 kg

16 bales = 2 unit =
2720 - 4000 kg

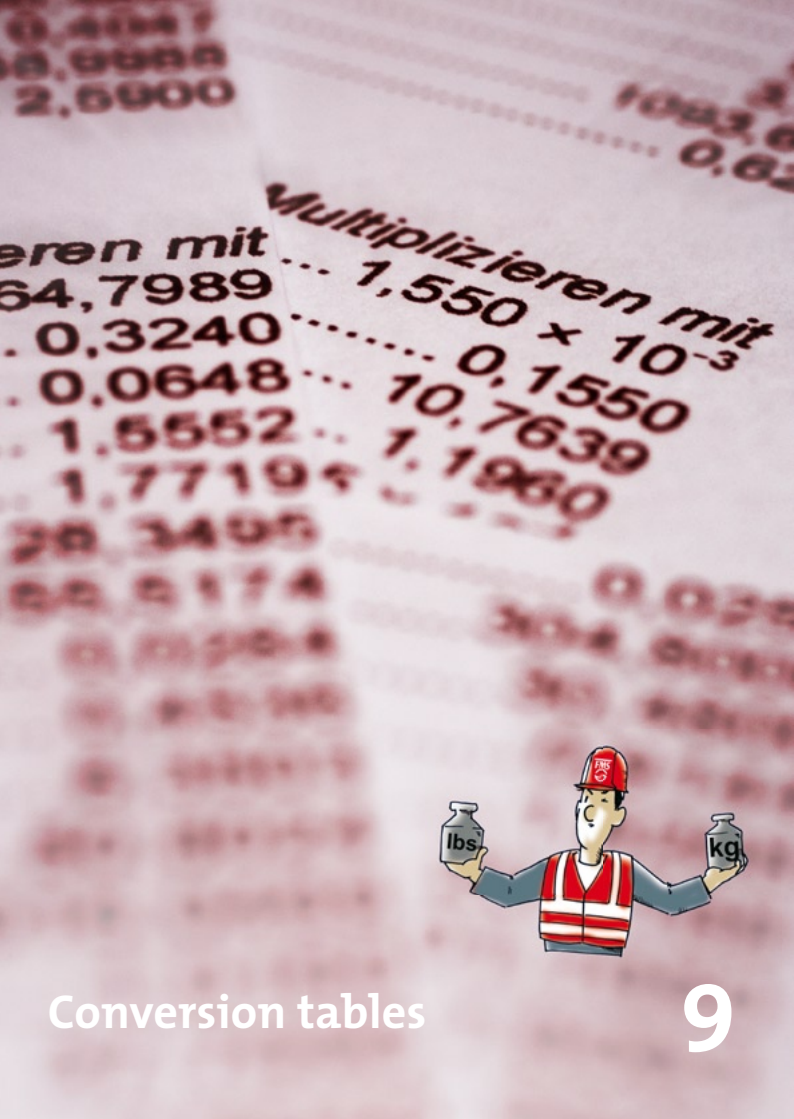
32 bales = 4 unit =
5440 - 8000 kg

48 bales = 6 unit =
8160 - 12000 kg

64 bales = 8 unit =
10880 - 16000 kg



Bales/unit average weight
Source: Bolzoni Auramo



Conversion tables

9

Conversion

Non-metric/metric system
Linear measures

	Multiply by
Milliinch in micrometre	25.4000
Inch in millimetre	25.4000
Inch in centimetre	2.5400
Inch in metre	0.0254
Foot in millimetre	304.8000
Foot in centimetre	30.4800
Yard in metre	0.9144
Fathom in metre	1.8288
Chain (= 66 feet) in metre	20.1168
Furlong (= 1/8 mile) in metre	201.1680
British mile in kilometre	1.6093
Nautical mile in kilometre	1.8520

Cubic and capacity measures

	Multiply by
Cubic inch in cubic centimetre	16.3871
Cubic inch in litre	0.0164

Cubic foot in cubic metre	0.0283
Cubic foot in litre	28.3169
Pint in litre	0.5683
Quart in litre	1.1365
Cubic yard in cubic metre	0.7646
British gallon in litre	4.5461
British fluid ounce in cubic centimetre	28.4131

Square measures

	Multiply by
Square inch in square millimetre	645.1600
Square inch in square centimetre	6.4516
Square foot in square centimetre	929.0304
Square foot in square metre	0.0929
Square yard in square metre	0.8361
Square yard in are	0.0084
Acre in square metre	4046.8564
Acre in are	40.4686
Acre in hectare	0.4047
Square mile in hectare	258.9988
Square miles in square kilometres	2.5900

Weights

	Multiply by
Grain in milligramme	64.7989
Grain in carat	0.3240
Grain in gramme	0.0648
Pennyweight in gramme	1.5552
Dram in gramme	1.7719
Ounce in gramme	28.3495
Ounce troy in carat	155.5174
Ounce in kilogramme	0.0284
British pound in kilogramme	0.4536
Stone in kilogramme	6.3503
Hundredweight in kilogramme	50.8024
British tonne in kilogramme	1016.0469
British tonne in metric tonne	1.0160
Tahil in gramme	37.7990
Kati in kilogramme	0.6048

Force and power

	Multiply by
Foot pound/second in watt	1.3558
British horsepower in watt	745.7000
Foot pound/second in kilowatt	0.0014
British horsepower in kilowatt	0.7457
British horsepower in metric horsepower	1.0139

Metric/non-metric system
Cubic and capacity measures

	Multiply by
Cubic centimetre in cubic inch	0.0610
Cubic metre in cubic foot	35.3147
Cubic metre in cubic yard	1.3080
Litre in cubic inch	61.0300
Litre in pint	1.7598
Litre in quart	0.8799
Litre in British gallon	0.2200
Litre in US gallon	0.2642

Weight

	Multiply by
Gramme in ounce	0.0353
Gramme in pound	0.0022
Kilogramme in pound	2.2046
Kilogramme in ounce	35.3357
Kilogramme in stone	0.1575
Kilogramme in hundredweight	0.0197
Metric tonne in British tonne	0.9842
Metric tonne in US tonne	1.1023

Speed

	Multiply by
Centimetre/second in foot/second	0.0328
Metre/second in foot/second	196.9000
Metre/second in foot/second	3.2810
Kilometre/hour in mile/hour	0.6214

Force and power

	Multiply by
Kilowatt in British horsepower	1.3410
Metric horsepower in British horsepower	0.9863
Metric horsepower in feet pound/second	542.4800
Newton in pound force	0.2248
Newton in pound	7.2330

Linear measures

	Multiply by
Millimetre in foot	3.281 x 10
Millimetre in inch	0.0394
Centimetre in inch	0.3937
Metre in yard	1.0936
Metre in foot	3.2810
Kilometre in yard	1093.6100
Kilometre in mile	0.6214

Square measures

	Multiply by
Square millimetre in square inch	1.550×10^{3}
Square centimetre in square inch	0.1550
Square metre in square feet	10.7639
Square metre in square yard	1.1960
Square metre in acre	2.47105×10^{4}
Square kilometre in square mile	0.3861
Square kilometre in acre	247.1050
Hectare in acre	2.4711

Linear measures

Inch		Centimetres
0.3937	1	2.5400
0.7874	2	5.0800
1.1811	3	7.6200
1.5748	4	10.1600
1.9685	5	12.7000
2.3622	6	15.2400
2.7559	7	17.7800
3.1496	8	20.3200
3.5433	9	22.8600

Feet		Metres
3.2808	1	0.3048
6.5617	2	0.6096
9.8425	3	0.9144
13.1234	4	1.2192
16.4042	5	1.5420
19.6850	6	1.8288
22.9659	7	2.1336
26.2467	8	2.4384
29.5276	9	2.7432

Yards		Metres
1,0936	1	0,9144
2,1872	2	1,8288
3,2808	3	2,7432
4,3745	4	3,6576
5,4581	5	4,5720
6,5617	6	5,4864
7,6553	7	6,4008
8,7489	8	7,3152
9,8425	9	8,2296

British miles		Kilometres
0,6214	1	1,6093
1,2427	2	3,2187
1,8641	3	4,8280
2,4855	4	6,4374
3,1069	5	8,0467
3,7282	6	9,6561
4,3496	7	11,2654
4,9710	8	12,8748
5,5923	9	14,4841

Cubic and capacity measures

Cubic inch		Cubic centimetres
0.0610	1	16.3871
0.1221	2	32.7741
0.1831	3	49.1612
0.2441	4	65.5483
0.3051	5	81.9353
0.3661	6	98.3224
0.4272	7	114.7095
0.4882	8	131.0965
0.5492	9	147.4836

Fluid ounce		Cubic centimetres
0.0352	1	28.4131
0.0704	2	56.8261
0.1060	3	85.2392
0.1408	4	113.6522
0.1760	5	142.0653
0.2112	6	170.4784
0.2464	7	198.8914
0.2816	8	227.3045
0.3168	9	255.7176

Cubic feet		Cubic metres
35.3147	1	0.0283
70.6293	2	0.0566
105.9440	3	0.0850
141.2587	4	0.1133
176.5734	5	0.1416
211.8880	6	0.1699
247.2027	7	0.1982
282.5174	8	0.2266
317.8320	9	0.2549

Cubic yards		Cubic metres
1.3080	1	0.7646
2.6159	2	1.5291
3.9239	3	2.2937
5.2318	4	3.0582
6.5398	5	3.8228
7.8477	6	4.5873
9.1557	7	5.3519
10.4636	8	6.1164
11.7716	9	6.8810

Pint		Litres
1.7589	1	0.5683
3.5195	2	1.1363
5.2793	3	1.7048
7.0390	4	2.2731
8.7988	5	2.8413
10.5586	6	3.4096
12.3183	7	3.9778
14.0781	8	4.5461
15.8378	9	5.1144

Quart		Litres
0.8799	1	1.1365
1.7598	2	2.2730
2.6396	3	3.4096
3.5194	4	4.5461
4.3994	5	5.6826
5.2793	6	6.8191
6.1592	7	7.9556
7.0390	8	9.0922
7.9189	9	10.2287

British gallons		Litres
0.2200	1	4.5461
0.4399	2	9.0922
0.6599	3	13.6383
0.8799	4	18.1844
1.0999	5	22.7305
1.3198	6	27.2765
1.5398	7	31.8226
1.7598	8	36.3687
1.9797	9	40.9148

Weights

Ounce		Grammes
0.0353	1	28.3495
0.0706	2	56.6991
0.1058	3	85.0486
0.1411	4	113.3981
0.1765	5	141.7476
0.2116	6	170.0971
0.2469	7	198.4467
0.2822	8	226.7962
0.3175	9	255.1457

British pounds		Kilogrammes
2.2046	1	0.4536
4.4092	2	0.9072
6.6139	3	1.3608
8.8185	4	1.8144
11.0231	5	2.2680
13.2277	6	2.7216
15.4324	7	3.1751
17.6370	8	3.6287
19.8416	9	4.0823

Hundredweight		Kilogrammes
0.0197	1	50.8023
0.0394	2	101.6047
0.0591	3	152.4070
0.0787	4	203.2094
0.0984	5	254.0117
0.1181	6	304.8141
0.1378	7	355.6164
0.1575	8	406.4198
0.1772	9	457.2211

British tonne		Kilogrammes
0.0010	1	1016.0469
0.0020	2	2032.0938
0.0030	3	3048.1407
0.0039	4	4064.1876
0.0049	5	5080.2345
0.0059	6	6096.2814
0.0069	7	7112.3283
0.0079	8	8128.3752
0.0089	9	9144.4221

Square measures

Square inch		Square centimetre
0.1550	1	6.4516
0.3100	2	12.9032
0.4650	3	19.3548
0.6200	4	25.8064
0.7750	5	32.2580
0.9300	6	38.7096
1.0850	7	45.1612
1.2400	8	51.6128
1.3950	9	58.0644

Square feet		Square metres
10.7639	1	0.9029
21.5278	2	0.1858
32.2917	3	0.2787
43.0556	4	0.3716
53.8196	5	0.4645
64.5835	6	0.5574
75.3474	7	0.6503
86.1113	8	0.7432
96.8752	9	0.8361

Square yards		Square metres
1.1960	1	0.8361
2.3920	2	1.6723
3.5880	3	2.5084
4.7840	4	3.3445
5.9800	5	4.1807
7.1759	6	5.0168
8.3719	7	5.8529
9.5679	8	6.6890
10.7639	9	7.5252

Acre		Hectare
2.4711	1	0.4047
4.9421	2	0.8094
7.4132	3	1.2141
9.8842	4	1.6188
12.3553	5	2.0235
14.8263	6	2.4281
17.2974	7	2.8328
19.7684	8	3.2375
22.2395	9	3.6422

British square miles		Square kilometres
0.3861	1	2.5900
0.7722	2	5.1800
1.1583	3	7.7700
1.5444	4	10.3600
1.9305	5	12.9500
2.3166	6	15.5399
2.7027	7	18.1299
3.0888	8	20.7199
3.4749	9	23.3099

Number of pallets in 20‘ container

possible slots on floor area

Pallet dimensions		Number of pallets in container
Length	Width	
600	400	53
800	600	26
1100	1100	10
1130	1130	10
1150	1150	10
1150	750	15
1200	1000	10
1200	800	11
1300	1100	8
1420	1120	8
2000	1250	4
2250	1250	4

Number of pallets in 40‘ container

possible slots on floor area

Pallet dimensions		Number of pallets in container
Length	Width	
600	400	108
800	600	53
1100	1100	20
1130	1130	20
1150	1150	20
1150	750	31
1200	1000	20
1200	800	24
1300	1100	18
1420	1120	16
2000	1250	9
2250	1250	9

Check list for conventional loading

Please complete a check list for each cargo and each ship

1. Cargo (to be completed by forwarding agent)

Item No:_____

Contact partner:_____

Telephone: Office:_____/_____

Mobile:_____/_____

The following cargo is ready for shipment

Number: Type: Weight:

Sheds: M/S: eta:

ets:

Photos: ☐ yes ☐ no Photo report: ☐ yes ☐ no

Loading arrangement: ☐ no ☐ yes

☐ vertical ☐ horizontal ☐ horizontal in sling

Miscellaneous:_____

Delivery conditions:_____

Right of disposal:_____

Peculiarities:_____

_____

Date:_____

2. Terminal (to be completed by quay operators)

Contact partner:_____

Telephone:_____/_____

Loading times: from date: Time:

to date: Time:

Number/Operations:

Peculiarities:_____

_____

Date:_____

3. Ship (to be completed by ship broker)

Contact partner:_____

Telephone office:_____/_____

Name of ship:_____ Year of manufacture:_____

Is the ship presently suitable without restriction for the aforementioned goods and does it comply with the currently applicable regulations?

☐ yes

☐ no for the following reason:_____

Is an advance inspection possible? ☐ no

☐ yes from date:

Contact partner: _____/_____ Berth:

Telephone: _____/_____

May photos be taken? ☐ yes ☐ no

Hold number(s) and probable slot: _____/_____

Understowage: ☐ no ☐ yes Cargo:_____

Overstowage: ☐ no ☐ yes Cargo:_____

Foreign cargo in direct contact with aforementioned goods? ☐ yes ☐ no

Can a stowage plan be requested for the ship? ☐ yes ☐ no

If no, size of cargo holds: Length: Width: Heigh:

Peculiarities: _____

_____

Who is responsible for cargo securing?_____

Who provides lashing material?_____

What lashing material is available?_____

Has lashing material already been used? ☐ yes ☐ no

Are wooden pallets available? ☐ yes ☐ no

Peculiarities (hatch cover, crane assistance, etc.):_____

_____

Date:_____

4. Stevedores (to be completed by stevedores)

Contact partner:_____

Telephone:_____/_____

Does information from parts I and II correspond with information provided?

☐ yes

☐ no Following deviations were noticed:_____

_____

Loading devices suitable for the goods available: ☐ yes ☐ no

Other remarks:_____

Date:_____

5. Survey (to be completed by inspector)

Item No:_____

Contact partner:_____

Telephone:_____/_____

Employee on site:_____

Telephone:_____/_____

Date:_____

6. Special notes

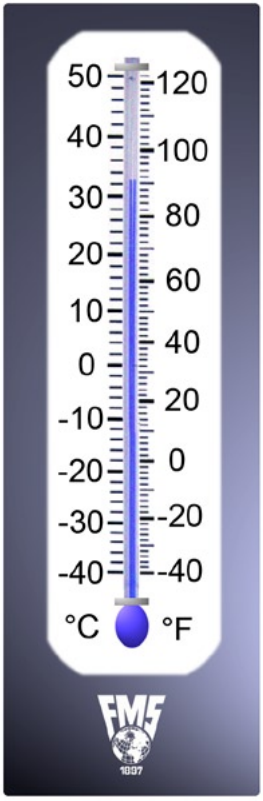
_____

_____

_____

_____

Temperature



$$°C = \frac{5(°F - 32)}{9}$$

$$°F = \frac{9 * °C}{5} + 32$$

Clamp pressure

Paper quality	Recommended clamp factor	Recommended initial value
Newsprint	from 1.3 to 1.6	1.6
Directory	from 1.3 to 1.7	1.6
LWC	from 1.6 to 1.9	1.9
MWC	from 1.6 to 1.9	1.9
SC	from 1.6 to 1.9	1.9
Fine paper	from 1.6 to 1.9	1.9

Note:
Recommended initial value x reel weight corresponds to recommended clamp pressure.

Formula:

Cfc = Freal / G	which corresponds to the following formula	Freal = Cfc * G

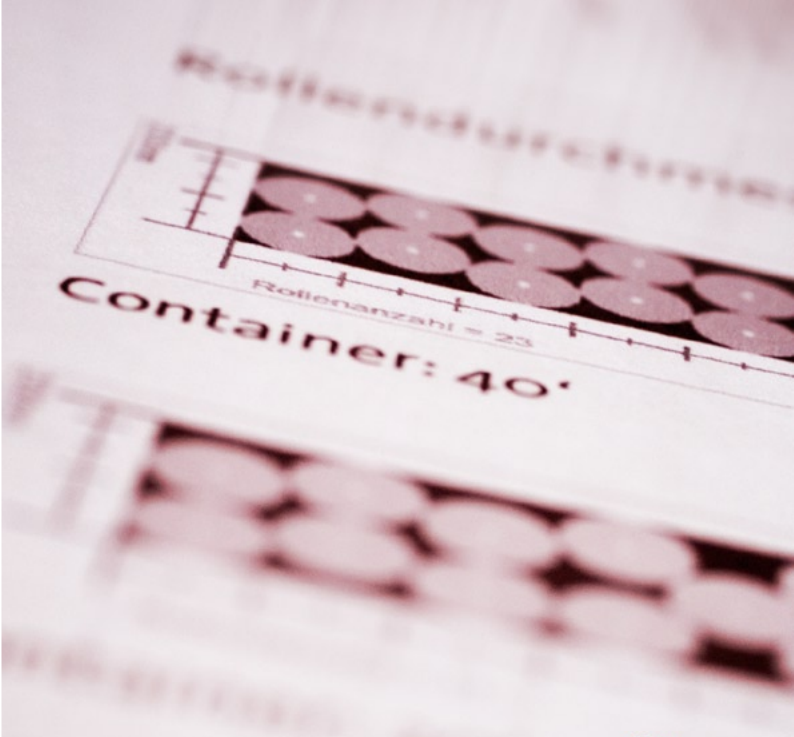
Freal = Clamp force in clamp

Cfc = Clamp factor

G = Minimum theoretical clamp force, i.e. normally load force (weight * gravitation)

Source: Bolzoni Auramo

All data without guarantee



Stowage arrangement 10

Number of slots for reels in ISO container

possible slots on floor area

Reel diameter	20' ISO-Container	40' ISO-Container
cm	20`	40`
50	55	118
51	55	115
52	53	113
53	50	105
54	46	97
55	43	90
56	42	88
57	41	85
58	40	83
59	38	80
60	37	79
61	36	76
62	36	75
63	35	74
64	34	72
65	32	70
66	30	66
67	29	61
68	27	58
69	27	55
70	25	54
71	24	51
72	24	51
73	24	49
74	24	48

Reel diameter	20' ISO-Container	40' ISO-Container
75	23	48
76	22	47
77	22	46
78	21	45
79	21	44
80	21	44
81	20	42
82	20	42
83	20	42
84	20	41
85	18	41
86	18	39
87	17	36
88	17	35
89	15	33
90	15	32
91	14	30
92	14	29
93	14	29
94	13	28
95	13	28
96	12	26
97	12	26
98	12	26
99	12	25
100	12	25

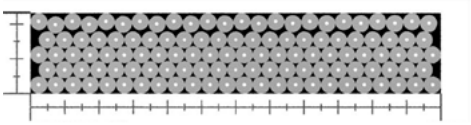
Reel diameter	20' ISO-Container	40' ISO-Container
101	12	24
102	11	24
103	11	24
104	11	23
105	10	22
106	10	22
107	10	22
108	10	22
109	10	22
110	10	21
111	10	21
112	10	21
113	10	20
114	10	20
115	10	20
116	10	20
117	9	20
118	9	19
119	8	19
120	8	19
121	8	18
122	8	18
123	8	18
124	8	18
125	8	18
126	7	17

Reel diameter	20' ISO-Container	40' ISO-Container
127	7	16
128	7	15
129	7	15
130	6	14
131	6	14
132	6	13
133	6	13
134	6	12
135	5	12
136	5	12
137	5	11
138	5	11
139	5	11
140	5	11
141	5	10
142	5	10
143	4	10
144	4	10
145	4	10
146	4	9
147	4	9
148	4	9
149	4	9
150	4	9
151	4	9
152	4	9

Reel diameter	20' ISO-Container	40' ISO-Container
153	4	9
154	4	8
155	4	8
156	4	8
157	4	8
158	4	8
159	4	8
160	3	8
161	3	8
162	3	8
163	3	8
164	3	7
165	3	7
166	3	7
167	3	7
168	3	7
169	3	7
170	3	7
171	3	7
172	3	7
173	3	7
174	3	7
175	3	7
176	3	7
177	3	7
178	3	7

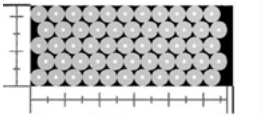
Reel diameter	20' ISO-Container	40' ISO-Container
179	3	6
180	3	6
181	3	6
182	3	6
183	3	6
184	3	6
185	3	6
186	3	6
187	3	6
188	3	6
189	3	6
190	3	6
191	3	6
192	3	6
193	3	6
194	3	6
195	3	6
196	3	6
197	3	6
198	2	6
199	2	6
200	2	6
201	2	6
202	2	6

Reel diameter 0500 mm



Container: 40‘

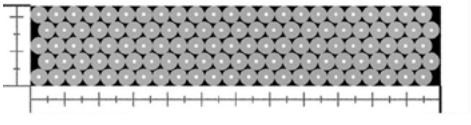
Loading length: 1199.6 cm
Loading width: 233 cm
Number of slots: 118



Loading length: 570.2 cm
Loading width: 233 cm
Number of slots: 55

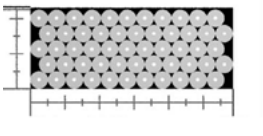
Container: 20‘

Reel diameter 0510 mm



Container: 40‘

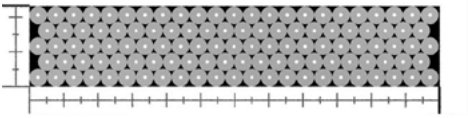
Loading length: 1196 cm
Loading width: 233 cm
Number of slots: 115



Loading length: 586.5 cm
Loading width: 233 cm
Number of slots: 55

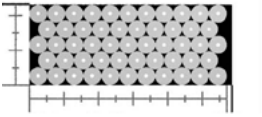
Container: 20‘

Reel diameter 0520 mm



Container: 40‘

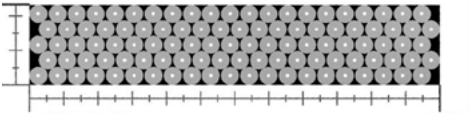
Loading length: 1196 cm
Loading width: 233 cm
Number of slots: 113



Container: 20‘

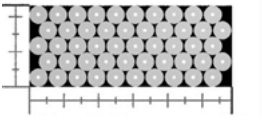
Loading length: 572 cm
Loading width: 233 cm
Number of slots: 53

Reel diameter 0530 mm



Container: 40‘

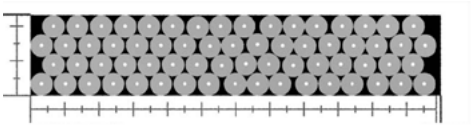
Loading length: 1199.8 cm
Loading width: 233 cm
Number of slots: 105



Container: 20‘

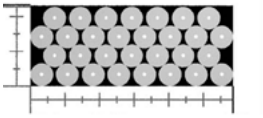
Loading length: 585 cm
Loading width: 233 cm
Number of slots: 50

Reel diameter 0660 mm



Container: 40‘

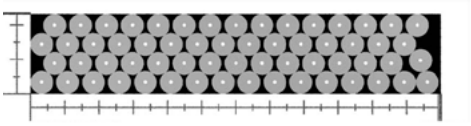
Loading length: 1186.5 cm
Loading width: 233 cm
Number of slots: 66



Container: 20‘

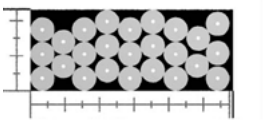
Loading length: 586.7 cm
Loading width: 233 cm
Number of slots: 30

Reel diameter 0670 mm



Container: 40‘

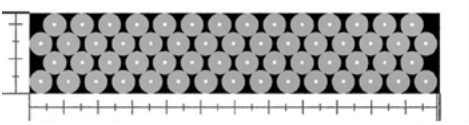
Loading length: 1193 cm
Loading width: 233 cm
Number of slots: 61



Container: 20‘

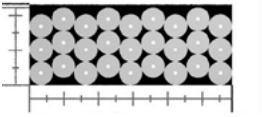
Loading length: 576.9 cm
Loading width: 233 cm
Number of slots: 25

Reel diameter 0680 mm



Container: 40‘

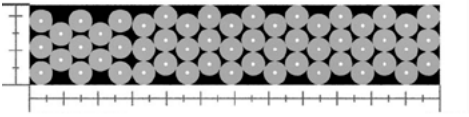
Loading length: 1191.9 cm
Loading width: 233 cm
Number of slots: 58



Loading length: 586.7 cm
Loading width: 233 cm
Number of slots: 27

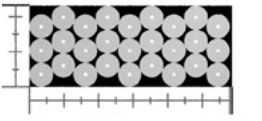
Container: 20‘

Reel diameter 0690 mm



Container: 40‘

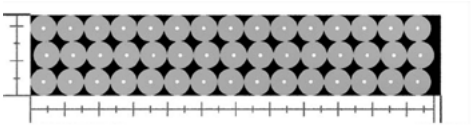
Loading length: 1199.8 cm
Loading width: 233 cm
Number of slots: 55



Loading length: 580.4 cm
Loading width: 233 cm
Number of slots: 27

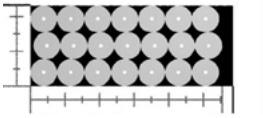
Container: 20‘

Reel diameter 0780 mm



Container: 40‘

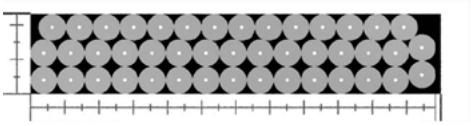
Loading length: 1178.8 cm
Loading width: 233 cm
Number of slots: 45



Container: 20‘

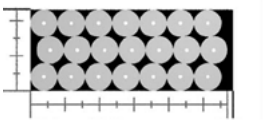
Loading length: 554.8 cm
Loading width: 233 cm
Number of slots: 21

Reel diameter 0790 mm



Container: 40‘

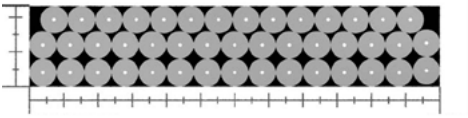
Loading length: 1183.4 cm
Loading width: 233 cm
Number of slots: 44



Container: 20‘

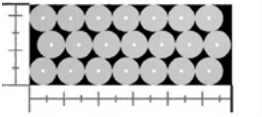
Loading length: 570.7 cm
Loading width: 233 cm
Number of slots: 21

Reel diameter 0800 mm



Container: 40‘

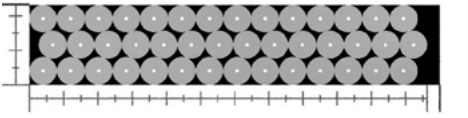
Loading length: 1199.8 cm
Loading width: 233 cm
Number of slots: 44



Loading length: 583.4 cm
Loading width: 233 cm
Number of slots: 21

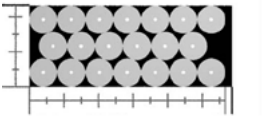
Container: 20‘

Reel diameter 0810 mm



Container: 40‘

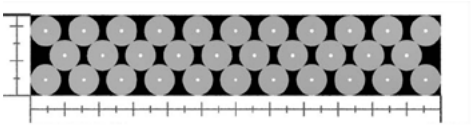
Loading length: 1162 cm
Loading width: 233 cm
Number of slots: 42



Loading length: 567 cm
Loading width: 233 cm
Number of slots: 20

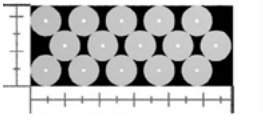
Container: 20‘

Reel diameter 0900 mm



Container: 40‘

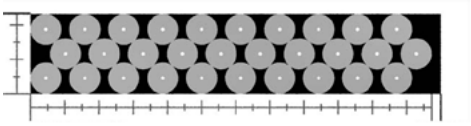
Loading length: 1199.8 cm
Loading width: 233 cm
Number of slots: 32



Container: 20‘

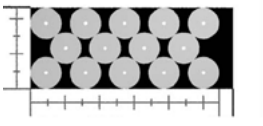
Loading length: 581.9 cm
Loading width: 233 cm
Number of slots: 15

Reel diameter 0910 mm



Container: 40‘

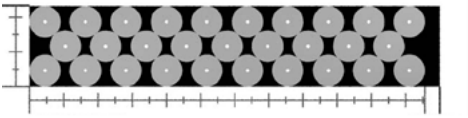
Loading length: 1172.1 cm
Loading width: 233 cm
Number of slots: 30



Container: 20‘

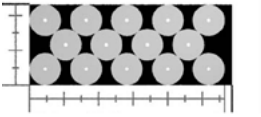
Loading length: 546.2 cm
Loading width: 233 cm
Number of slots: 14

Reel diameter 0920 mm



Container: 40‘

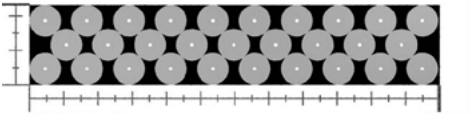
Loading length: 1155.8 cm
Loading width: 233 cm
Number of slots: 29



Loading length: 564.8 cm
Loading width: 233 cm
Number of slots: 14

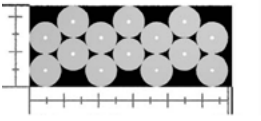
Container: 20‘

Reel diameter 0930 mm



Container: 40‘

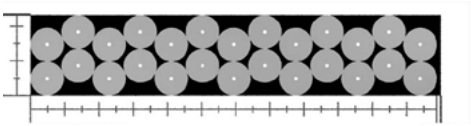
Loading length: 1194.6 cm
Loading width: 233 cm
Number of slots: 29



Loading length: 575.8 cm
Loading width: 233 cm
Number of slots: 14

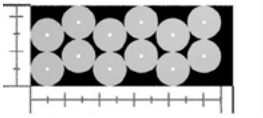
Container: 20‘

Reel diameter 0980 mm



Container: 40‘

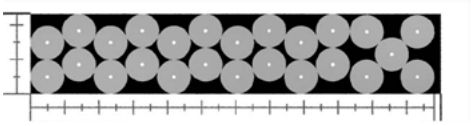
Loading length: 1187.9 cm
Loading width: 233 cm
Number of slots: 26



Loading length: 551.7 cm
Loading width: 233 cm
Number of slots: 12

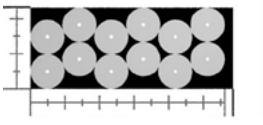
Container: 20‘

Reel diameter 0990 mm



Container: 40‘

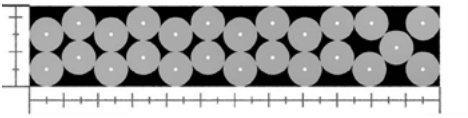
Loading length: 1178.6 cm
Loading width: 233 cm
Number of slots: 25



Loading length: 562 cm
Loading width: 233 cm
Number of slots: 12

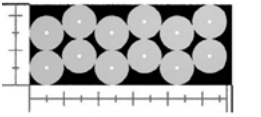
Container: 20‘

Reel diameter 1000 mm



Container: 40‘

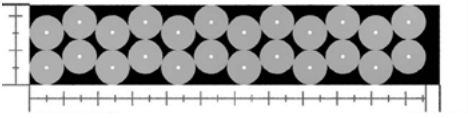
Loading length: 1199.8 cm
Loading width: 233 cm
Number of slots: 25



Container: 20‘

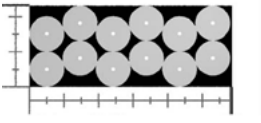
Loading length: 572 cm
Loading width: 233 cm
Number of slots: 12

Reel diameter 1010 mm



Container: 40‘

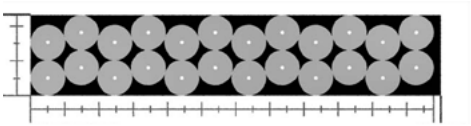
Loading length: 1158.4 cm
Loading width: 233 cm
Number of slots: 24



Container: 20‘

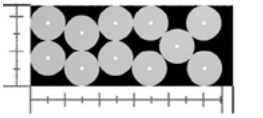
Loading length: 581.6 cm
Loading width: 233 cm
Number of slots: 12

Reel diameter 1020 mm



Container: 40‘

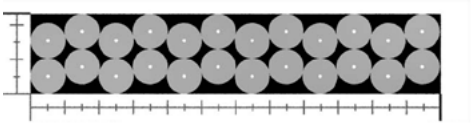
Loading length: 1177.7 cm
Loading width: 233 cm
Number of slots: 24



Loading length: 554.7 cm
Loading width: 233 cm
Number of slots: 11

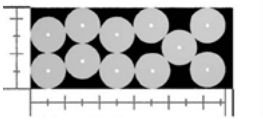
Container: 20‘

Reel diameter 1030 mm



Container: 40‘

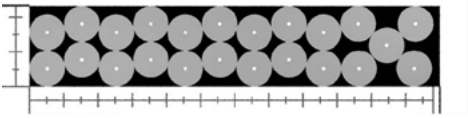
Loading length: 1196.4 cm
Loading width: 233 cm
Number of slots: 24



Loading length: 563.9 cm
Loading width: 233 cm
Number of slots: 11

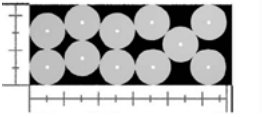
Container: 20‘

Reel diameter 1040 mm



Container: 40‘

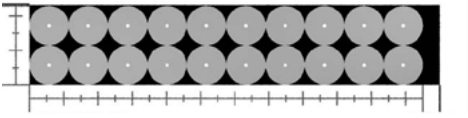
Loading length: 1179.5 cm
Loading width: 233 cm
Number of slots: 23



Loading length: 571.7 cm
Loading width: 233 cm
Number of slots: 11

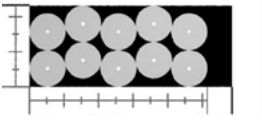
Container: 20‘

Reel diameter 1050 mm



Container: 40‘

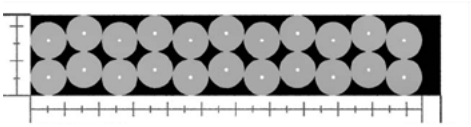
Loading length: 1150 cm
Loading width: 233 cm
Number of slots: 20



Loading length: 514.8 cm
Loading width: 233 cm
Number of slots: 10

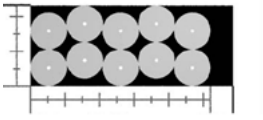
Container: 20‘

Reel diameter 1060 mm



Container: 40‘

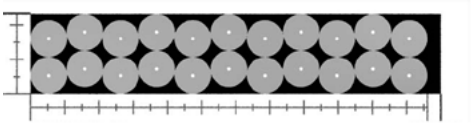
Loading length: 1145.1 cm
Loading width: 233 cm
Number of slots: 22



Loading length: 521.7 cm
Loading width: 233 cm
Number of slots: 10

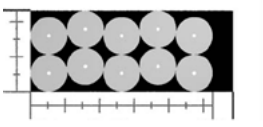
Container: 20‘

Reel diameter 1070 mm



Container: 40‘

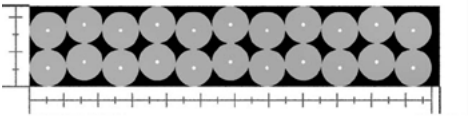
Loading length: 1160 cm
Loading width: 233 cm
Number of slots: 22



Loading length: 528.3 cm
Loading width: 233 cm
Number of slots: 10

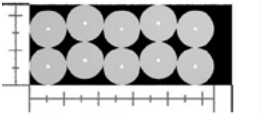
Container: 20‘

Reel diameter 1080 mm



Container: 40‘

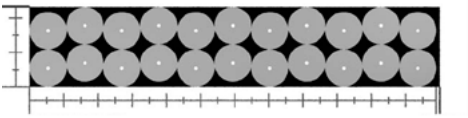
Loading length: 1174.7 cm
Loading width: 233 cm
Number of slots: 22



Loading length: 534.7 cm
Loading width: 233 cm
Number of slots: 10

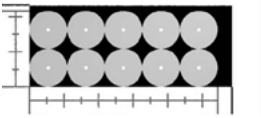
Container: 20‘

Reel diameter 1090 mm



Container: 40‘

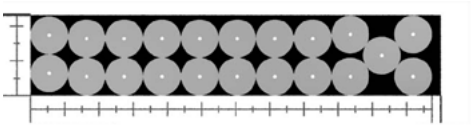
Loading length: 1189.1 cm
Loading width: 233 cm
Number of slots: 22



Loading length: 545 cm
Loading width: 233 cm
Number of slots: 10

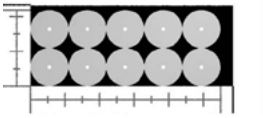
Container: 20‘

Reel diameter 1100 mm



Container: 40‘

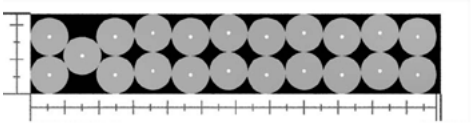
Loading length: 1172.8 cm
Loading width: 233 cm
Number of slots: 21



Container: 20‘

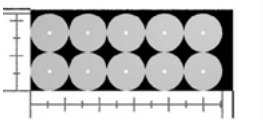
Loading length: 550 cm
Loading width: 233 cm
Number of slots: 10

Reel diameter 1110 mm



Container: 40‘

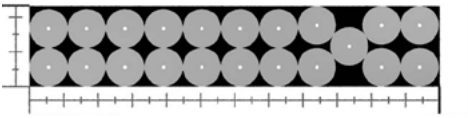
Loading length: 1186.9 cm
Loading width: 233 cm
Number of slots: 21



Container: 20‘

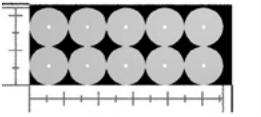
Loading length: 555 cm
Loading width: 233 cm
Number of slots: 10

Reel diameter 1120 mm



Container: 40‘

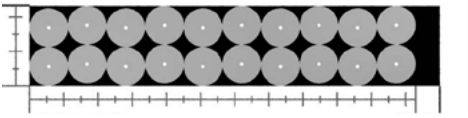
Loading length: 1196.5 cm
Loading width: 233 cm
Number of slots: 21



Loading length: 560 cm
Loading width: 233 cm
Number of slots: 10

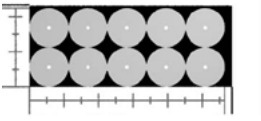
Container: 20‘

Reel diameter 1130 mm



Container: 40‘

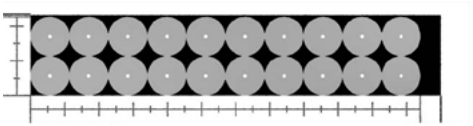
Loading length: 1128 cm
Loading width: 233 cm
Number of slots: 20



Loading length: 565 cm
Loading width: 233 cm
Number of slots: 10

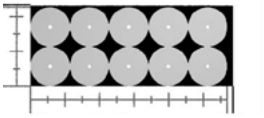
Container: 20‘

Reel diameter 1140 mm



Container: 40‘

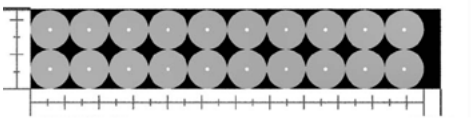
Loading length: 1140 cm
Loading width: 233 cm
Number of slots: 20



Container: 20‘

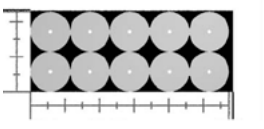
Loading length: 570 cm
Loading width: 233 cm
Number of slots: 10

Reel diameter 1150 mm



Container: 40‘

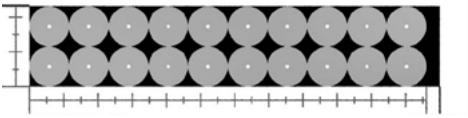
Loading length: 1150 cm
Loading width: 233 cm
Number of slots: 20



Container: 20‘

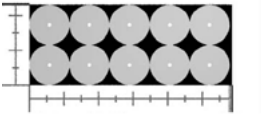
Loading length: 575 cm
Loading width: 233 cm
Number of slots: 10

Reel diameter 1160 mm



Container: 40‘

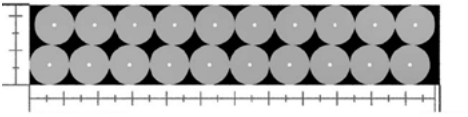
Loading length: 1160 cm
Loading width: 233 cm
Number of slots: 20



Loading length: 580 cm
Loading width: 233 cm
Number of slots: 10

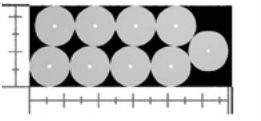
Container: 20‘

Reel diameter 1170 mm



Container: 40‘

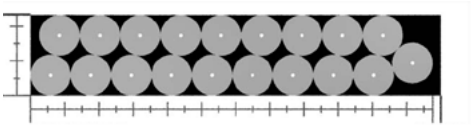
Loading length: 1185.3 cm
Loading width: 233 cm
Number of slots: 20



Loading length: 576.5 cm
Loading width: 233 cm
Number of slots: 9

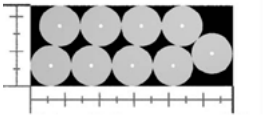
Container: 20‘

Reel diameter 1180 mm



Container: 40‘

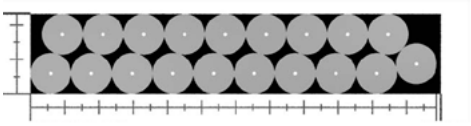
Loading length: 1174.9 cm
Loading width: 233 cm
Number of slots: 19



Container: 20‘

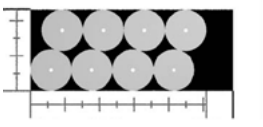
Loading length: 584.9 cm
Loading width: 233 cm
Number of slots: 9

Reel diameter 1190 mm



Container: 40‘

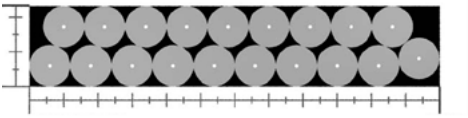
Loading length: 1186.8 cm
Loading width: 233 cm
Number of slots: 19



Container: 20‘

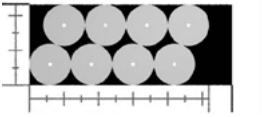
Loading length: 508.8 cm
Loading width: 233 cm
Number of slots: 8

Reel diameter 1200 mm



Container: 40‘

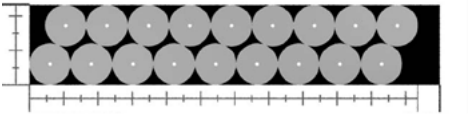
Loading length: 1198.2 cm
Loading width: 233 cm
Number of slots: 19



Loading length: 520.4 cm
Loading width: 233 cm
Number of slots: 8

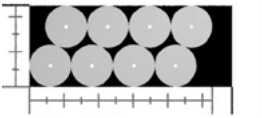
Container: 20‘

Reel diameter 1210 mm



Container: 40‘

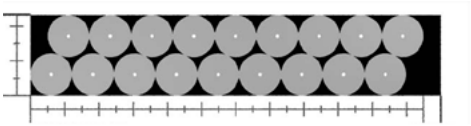
Loading length: 1134.8 cm
Loading width: 233 cm
Number of slots: 18



Loading length: 529.8 cm
Loading width: 233 cm
Number of slots: 8

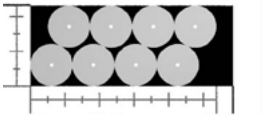
Container: 20‘

Reel diameter 1220 mm



Container: 40‘

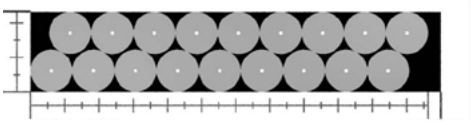
Loading length: 1148.6 cm
Loading width: 233 cm
Number of slots: 18



Container: 20‘

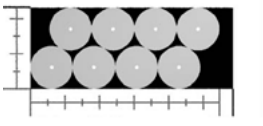
Loading length: 538.6 cm
Loading width: 233 cm
Number of slots: 8

Reel diameter 1230 mm



Container: 40‘

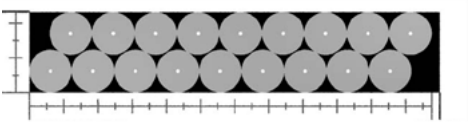
Loading length: 1162 cm
Loading width: 233 cm
Number of slots: 18



Container: 20‘

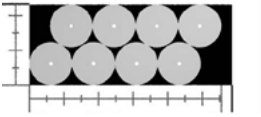
Loading length: 547 cm
Loading width: 233 cm
Number of slots: 8

Reel diameter 1240 mm



Container: 40‘

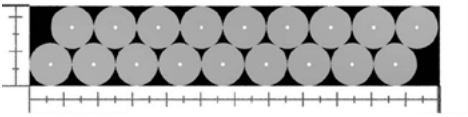
Loading length: 1175.1 cm
Loading width: 233 cm
Number of slots: 18



Loading length: 556.1 cm
Loading width: 233 cm
Number of slots: 8

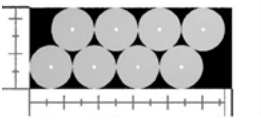
Container: 20‘

Reel diameter 1250 mm



Container: 40‘

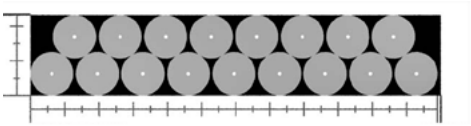
Loading length: 1194.3 cm
Loading width: 233 cm
Number of slots: 18



Loading length: 565.3 cm
Loading width: 233 cm
Number of slots: 8

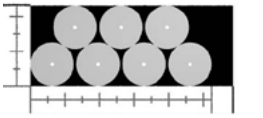
Container: 20‘

Reel diameter 1260 mm



Container: 40‘

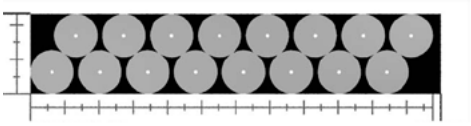
Loading length: 1190 cm
Loading width: 233 cm
Number of slots: 17



Container: 20‘

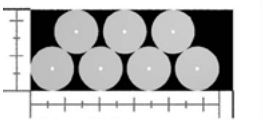
Loading length: 525 cm
Loading width: 233 cm
Number of slots: 7

Reel diameter 1270 mm



Container: 40‘

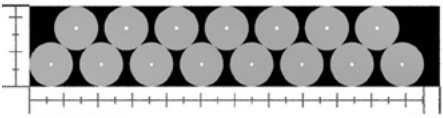
Loading length: 1175.5 cm
Loading width: 233 cm
Number of slots: 16



Container: 20‘

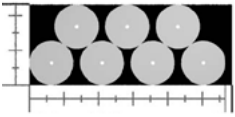
Loading length: 546.4 cm
Loading width: 233 cm
Number of slots: 7

Reel diameter 1280 mm



Container: 40‘

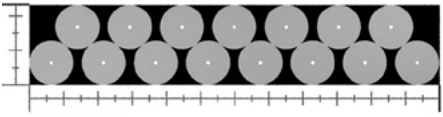
Loading length: 1152.8 cm
Loading width: 233 cm
Number of slots: 15



Loading length: 567.2 cm
Loading width: 233 cm
Number of slots: 7

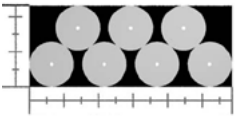
Container: 20‘

Reel diameter 1290 mm



Container: 40‘

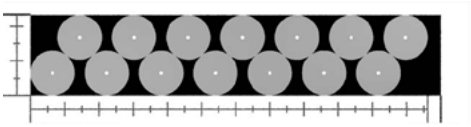
Loading length: 1197.2 cm
Loading width: 233 cm
Number of slots: 15



Loading length: 586.7 cm
Loading width: 233 cm
Number of slots: 7

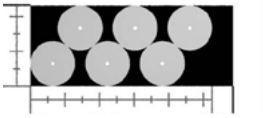
Container: 20‘

Reel diameter 1300 mm



Container: 40‘

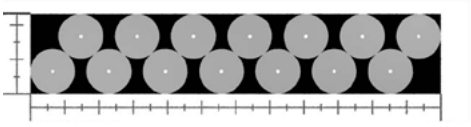
Loading length: 1160.9 cm
Loading width: 233 cm
Number of slots: 14



Container: 20‘

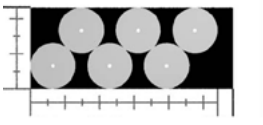
Loading length: 526.5 cm
Loading width: 233 cm
Number of slots: 6

Reel diameter 1310 mm



Container: 40‘

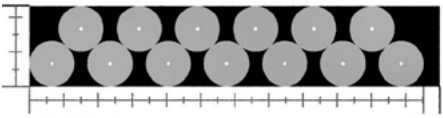
Loading length: 1199.6 cm
Loading width: 233 cm
Number of slots: 14



Container: 20‘

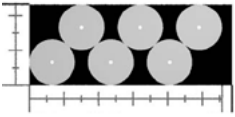
Loading length: 542 cm
Loading width: 233 cm
Number of slots: 6

Reel diameter 1320 mm



Container: 40‘

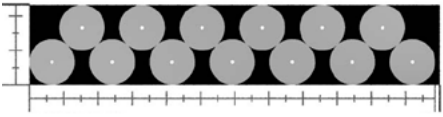
Loading length: 1152 cm
Loading width: 233 cm
Number of slots: 13



Loading length: 557 cm
Loading width: 233 cm
Number of slots: 6

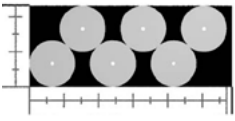
Container: 20‘

Reel diameter 1330 mm



Container: 40‘

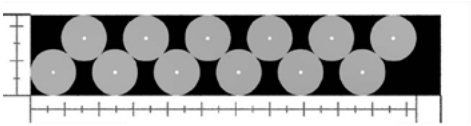
Loading length: 1185.4 cm
Loading width: 233 cm
Number of slots: 13



Loading length: 571.5 cm
Loading width: 233 cm
Number of slots: 6

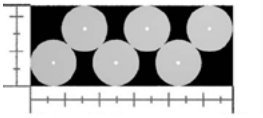
Container: 20‘

Reel diameter 1340 mm



Container: 40‘

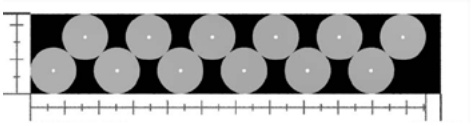
Loading length: 1127.3 cm
Loading width: 233 cm
Number of slots: 12



Container: 20‘

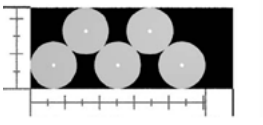
Loading length: 585.5 cm
Loading width: 233 cm
Number of slots: 6

Reel diameter 1350 mm



Container: 40‘

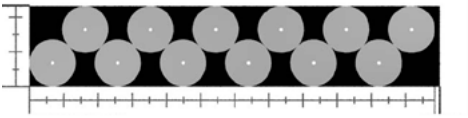
Loading length: 1155.8 cm
Loading width: 233 cm
Number of slots: 12



Container: 20‘

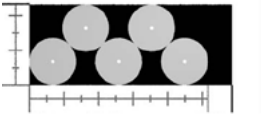
Loading length: 506.2 cm
Loading width: 233 cm
Number of slots: 5

Reel diameter 1360 mm



Container: 40‘

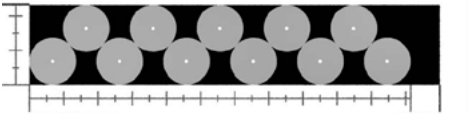
Loading length: 1184.3 cm
Loading width: 233 cm
Number of slots: 12



Loading length: 517.2 cm
Loading width: 233 cm
Number of slots: 5

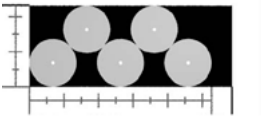
Container: 20‘

Reel diameter 1370 mm



Container: 40‘

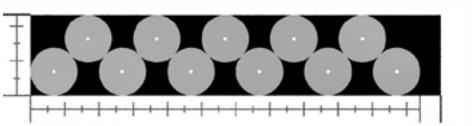
Loading length: 1114 cm
Loading width: 233 cm
Number of slots: 11



Loading length: 527.8 cm
Loading width: 233 cm
Number of slots: 5

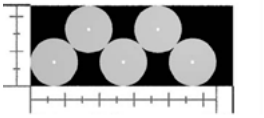
Container: 20‘

Reel diameter 1380 mm



Container: 40‘

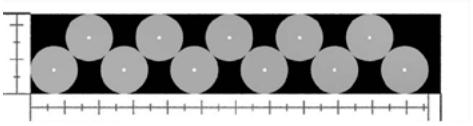
Loading length: 1139 cm
Loading width: 233 cm
Number of slots: 11



Container: 20‘

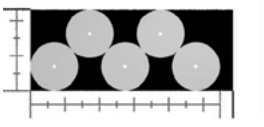
Loading length: 538.4 cm
Loading width: 233 cm
Number of slots: 5

Reel diameter 1390 mm



Container: 40‘

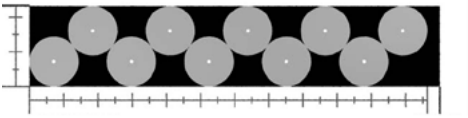
Loading length: 1163 cm
Loading width: 233 cm
Number of slots: 11



Container: 20‘

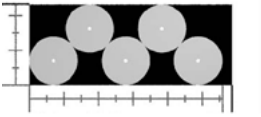
Loading length: 548.6 cm
Loading width: 233 cm
Number of slots: 5

Reel diameter 1400 mm



Container: 40‘

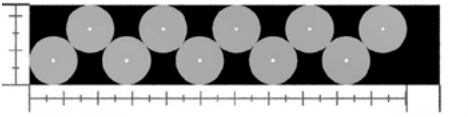
Loading length: 1162.8 cm
Loading width: 233 cm
Number of slots: 10



Container: 20‘

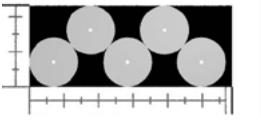
Loading length: 558.4 cm
Loading width: 233 cm
Number of slots: 5

Reel diameter 1410 mm



Container: 40‘

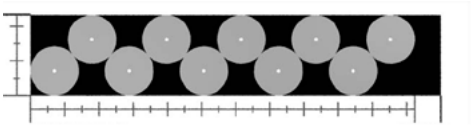
Loading length: 1103.1 cm
Loading width: 233 cm
Number of slots: 10



Container: 20‘

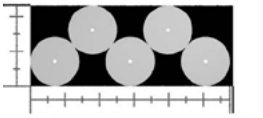
Loading length: 568.5 cm
Loading width: 233 cm
Number of slots: 5

Reel diameter 1420 mm



Container: 40‘

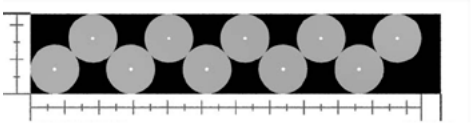
Loading length: 1123 cm
Loading width: 233 cm
Number of slots: 10



Container: 20‘

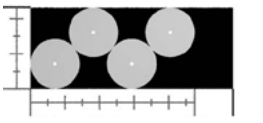
Loading length: 578 cm
Loading width: 233 cm
Number of slots: 5

Reel diameter 1430 mm



Container: 40‘

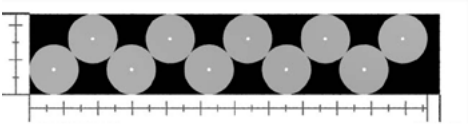
Loading length: 1142.9 cm
Loading width: 233 cm
Number of slots: 10



Container: 20‘

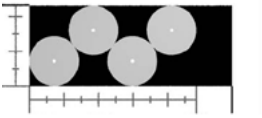
Loading length: 476.3 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1440 mm



Container: 40‘

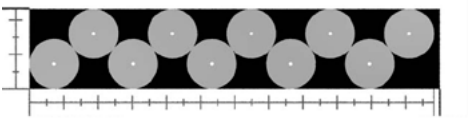
Loading length: 1162.8 cm
Loading width: 233 cm
Number of slots: 10



Loading length: 483.6 cm
Loading width: 233 cm
Number of slots: 4

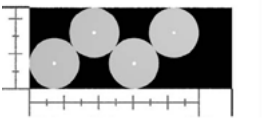
Container: 20‘

Reel diameter 1450 mm



Container: 40‘

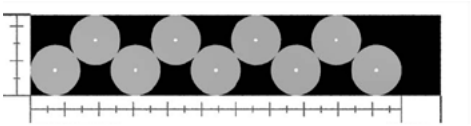
Loading length: 1181.8 cm
Loading width: 233 cm
Number of slots: 10



Loading length: 490.6 cm
Loading width: 233 cm
Number of slots: 4

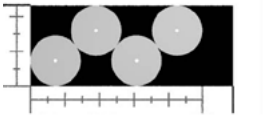
Container: 20‘

Reel diameter 1460 mm



Container: 40‘

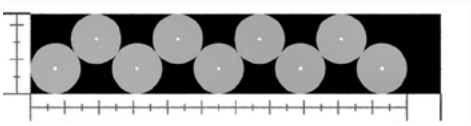
Loading length: 1083.6 cm
Loading width: 233 cm
Number of slots: 9



Container: 20‘

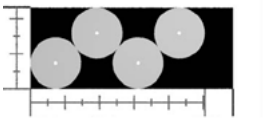
Loading length: 497.6 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1470 mm



Container: 40‘

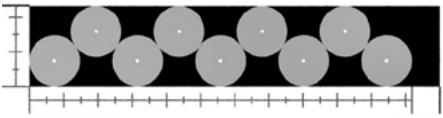
Loading length: 1100.5 cm
Loading width: 233 cm
Number of slots: 9



Container: 20‘

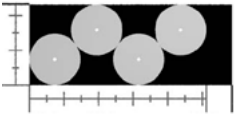
Loading length: 504.6 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1480 mm



Container: 40‘

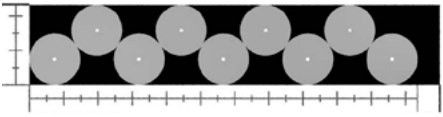
Loading length: 1117.6 cm
Loading width: 233 cm
Number of slots: 9



Loading length: 511.6 cm
Loading width: 233 cm
Number of slots: 4

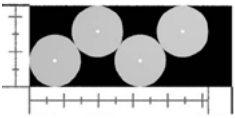
Container: 20‘

Reel diameter 1490 mm



Container: 40‘

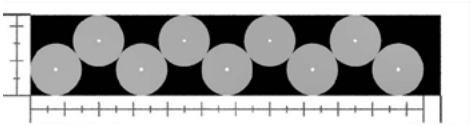
Loading length: 1133.8 cm
Loading width: 233 cm
Number of slots: 9



Loading length: 518.3 cm
Loading width: 233 cm
Number of slots: 4

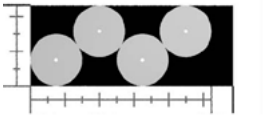
Container: 20‘

Reel diameter 1500 mm



Container: 40‘

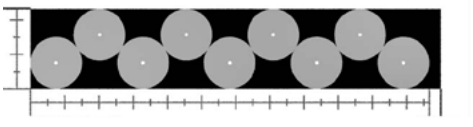
Loading length: 1149.2 cm
Loading width: 233 cm
Number of slots: 9



Container: 20‘

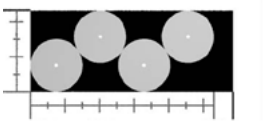
Loading length: 524.7 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1510 mm



Container: 40‘

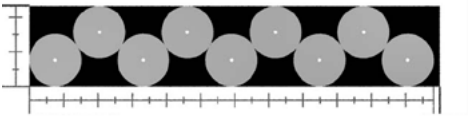
Loading length: 1165.4 cm
Loading width: 233 cm
Number of slots: 9



Container: 20‘

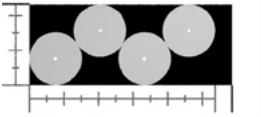
Loading length: 531.4 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1520 mm



Container: 40‘

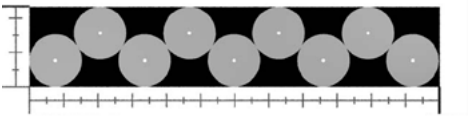
Loading length: 1180.8 cm
Loading width: 233 cm
Number of slots: 9



Loading length: 537.8 cm
Loading width: 233 cm
Number of slots: 4

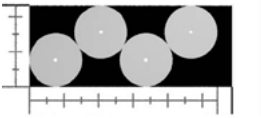
Container: 20‘

Reel diameter 1530 mm



Container: 40‘

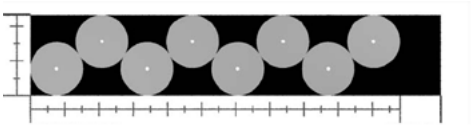
Loading length: 1196.2 cm
Loading width: 233 cm
Number of slots: 9



Loading length: 544.2 cm
Loading width: 233 cm
Number of slots: 4

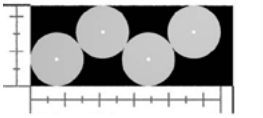
Container: 20‘

Reel diameter 1540 mm



Container: 40‘

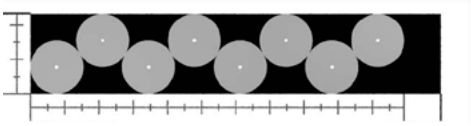
Loading length: 1079.4 cm
Loading width: 233 cm
Number of slots: 8



Container: 20‘

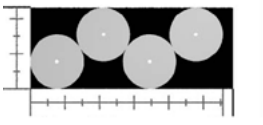
Loading length: 550.6 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1550 mm



Container: 40‘

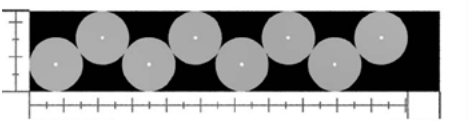
Loading length: 1092.3 cm
Loading width: 233 cm
Number of slots: 8



Container: 20‘

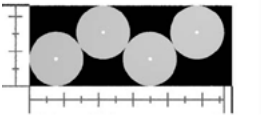
Loading length: 556.7 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1560 mm



Container: 40‘

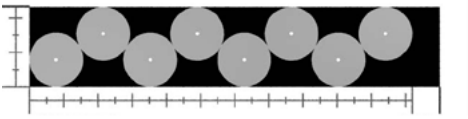
Loading length: 1105.7 cm
Loading width: 233 cm
Number of slots: 8



Container: 20‘

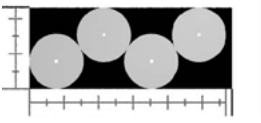
Loading length: 563 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1570 mm



Container: 40‘

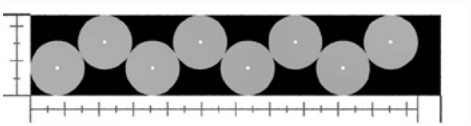
Loading length: 1116.7 cm
Loading width: 233 cm
Number of slots: 8



Container: 20‘

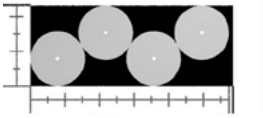
Loading length: 569.1 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1580 mm



Container: 40‘

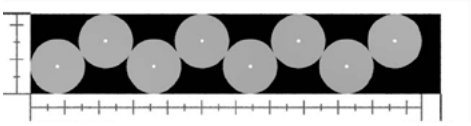
Loading length: 1131.5 cm
Loading width: 233 cm
Number of slots: 8



Container: 20‘

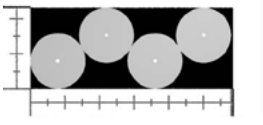
Loading length: 575.2 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1590 mm



Container: 40‘

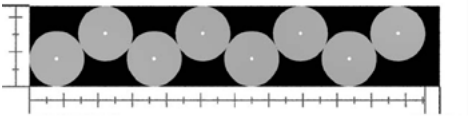
Loading length: 1143.9 cm
Loading width: 233 cm
Number of slots: 8



Container: 20‘

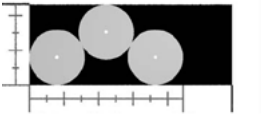
Loading length: 581.1 cm
Loading width: 233 cm
Number of slots: 4

Reel diameter 1600 mm



Container: 40‘

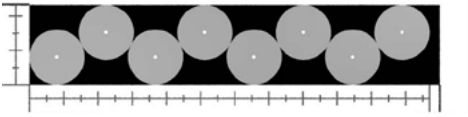
Loading length: 1156.6 cm
Loading width: 233 cm
Number of slots: 8



Loading length: 444.8 cm
Loading width: 233 cm
Number of slots: 3

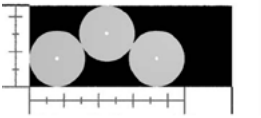
Container: 20‘

Reel diameter 1610 mm



Container: 40‘

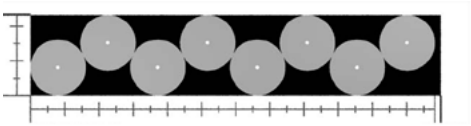
Loading length: 1169 cm
Loading width: 233 cm
Number of slots: 8



Loading length: 449 cm
Loading width: 233 cm
Number of slots: 3

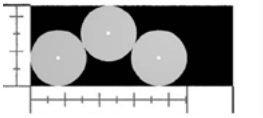
Container: 20‘

Reel diameter 1620 mm



Container: 40‘

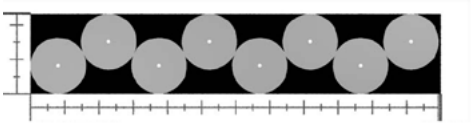
Loading length: 1181.2 cm
Loading width: 233 cm
Number of slots: 8



Loading length: 453.2 cm
Loading width: 233 cm
Number of slots: 3

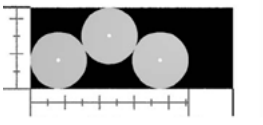
Container: 20‘

Reel diameter 1630 mm



Container: 40‘

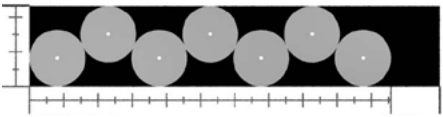
Loading length: 1193.4 cm
Loading width: 233 cm
Number of slots: 8



Loading length: 457.4 cm
Loading width: 233 cm
Number of slots: 3

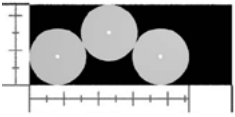
Container: 20‘

Reel diameter 1640 mm



Container: 40‘

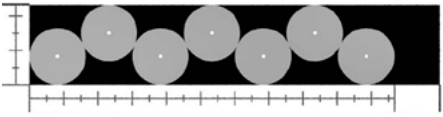
Loading length: 1056.8 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

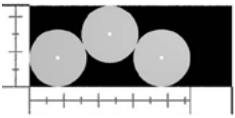
Loading length: 461.6 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1650 mm



Container: 40‘

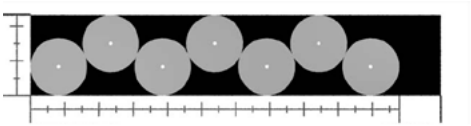
Loading length: 1066.8 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

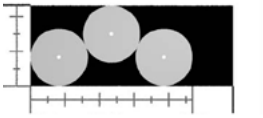
Loading length: 465.6 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1660 mm



Container: 40‘

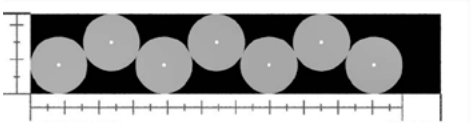
Loading length: 1077.4 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

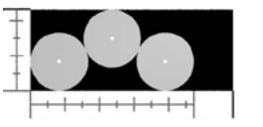
Loading length: 489.8 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1670 mm



Container: 40‘

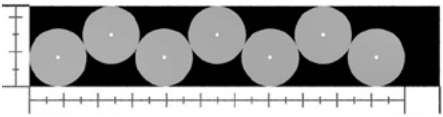
Loading length: 1087.4 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

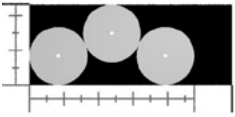
Loading length: 473.8 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1680 mm



Container: 40‘

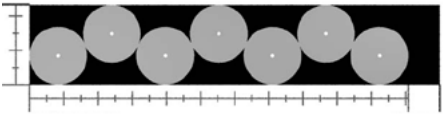
Loading length: 1097.4 cm
Loading width: 233 cm
Number of slots: 7



Loading length: 477.8 cm
Loading width: 233 cm
Number of slots: 3

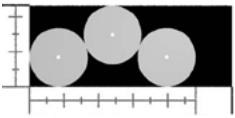
Container: 20‘

Reel diameter 1690 mm



Container: 40‘

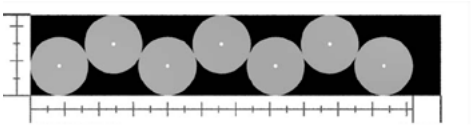
Loading length: 1107.4 cm
Loading width: 233 cm
Number of slots: 7



Loading length: 481.8 cm
Loading width: 233 cm
Number of slots: 3

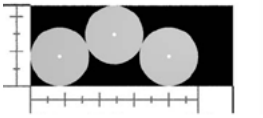
Container: 20‘

Reel diameter 1700 mm



Container: 40‘

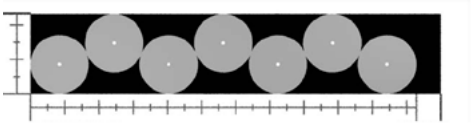
Loading length: 1117.4 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

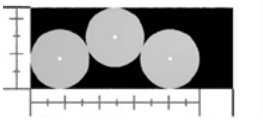
Loading length: 485.8 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1710 mm



Container: 40‘

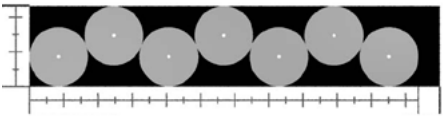
Loading length: 1127.4 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

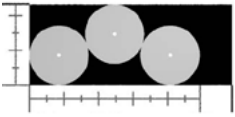
Loading length: 489.8 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1720 mm



Container: 40‘

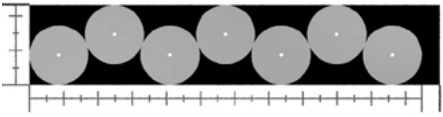
Loading length: 1136.8 cm
Loading width: 233 cm
Number of slots: 7



Loading length: 493.6 cm
Loading width: 233 cm
Number of slots: 3

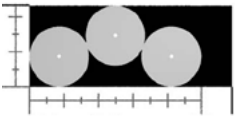
Container: 20‘

Reel diameter 1730 mm



Container: 40‘

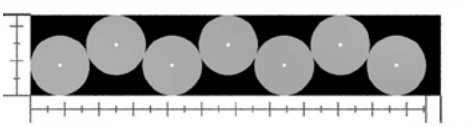
Loading length: 1146.8 cm
Loading width: 233 cm
Number of slots: 7



Loading length: 497.6 cm
Loading width: 233 cm
Number of slots: 3

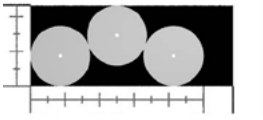
Container: 20‘

Reel diameter 1740 mm



Container: 40‘

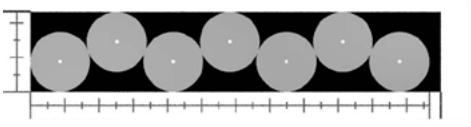
Loading length: 1156.2 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

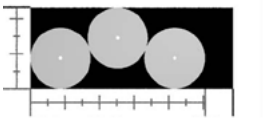
Loading length: 501.4 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1750 mm



Container: 40‘

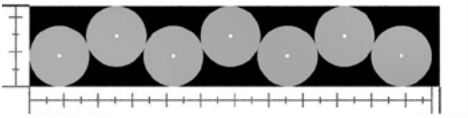
Loading length: 1165.6 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

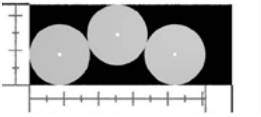
Loading length: 505.2 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1760 mm



Container: 40‘

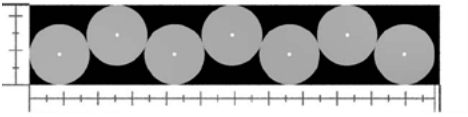
Loading length: 1175 cm
Loading width: 233 cm
Number of slots: 7



Loading length: 509 cm
Loading width: 233 cm
Number of slots: 3

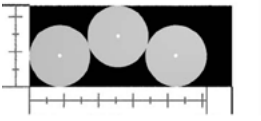
Container: 20‘

Reel diameter 1770 mm



Container: 40‘

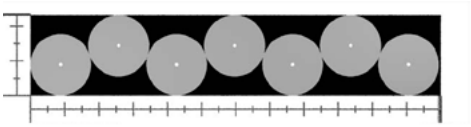
Loading length: 1184.4 cm
Loading width: 233 cm
Number of slots: 7



Loading length: 512.8 cm
Loading width: 233 cm
Number of slots: 3

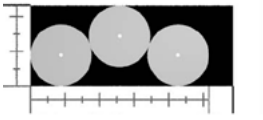
Container: 20‘

Reel diameter 1780 mm



Container: 40‘

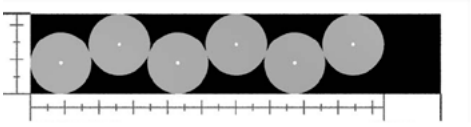
Loading length: 1193.8 cm
Loading width: 233 cm
Number of slots: 7



Container: 20‘

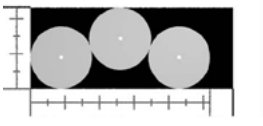
Loading length: 516.6 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1790 mm



Container: 40‘

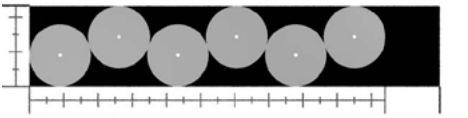
Loading length: 1032.5 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

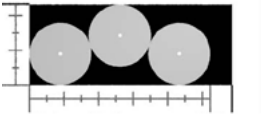
Loading length: 520.4 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1800 mm



Container: 40‘

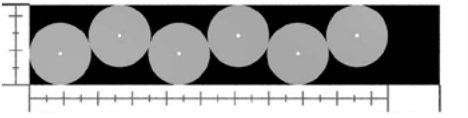
Loading length: 1040 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 524 cm
Loading width: 233 cm
Number of slots: 3

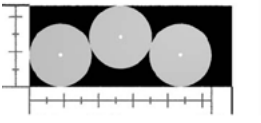
Container: 20‘

Reel diameter 1810 mm



Container: 40‘

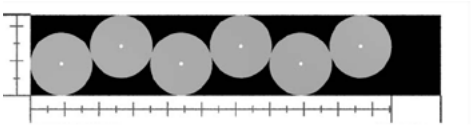
Loading length: 1048 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 527.8 cm
Loading width: 233 cm
Number of slots: 3

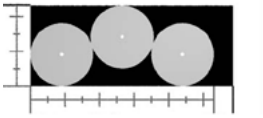
Container: 20‘

Reel diameter 1820 mm



Container: 40‘

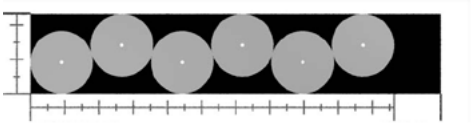
Loading length: 1055.5 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

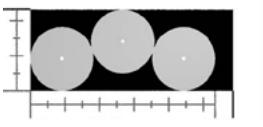
Loading length: 531.4 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1830 mm



Container: 40‘

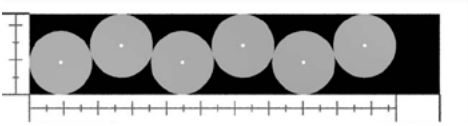
Loading length: 1063 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

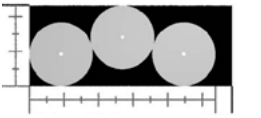
Loading length: 535 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1840 mm



Container: 40‘

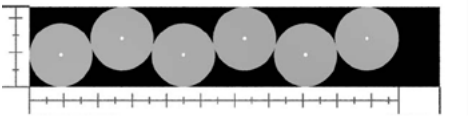
Loading length: 1071 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 538.8 cm
Loading width: 233 cm
Number of slots: 3

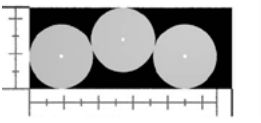
Container: 20‘

Reel diameter 1850 mm



Container: 40‘

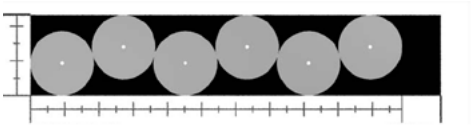
Loading length: 1078.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 542.4 cm
Loading width: 233 cm
Number of slots: 3

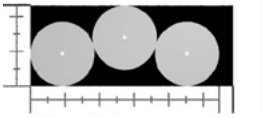
Container: 20‘

Reel diameter 1860 mm



Container: 40‘

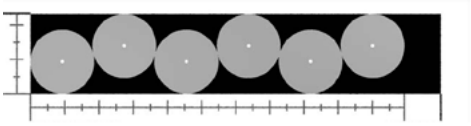
Loading length: 1086 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

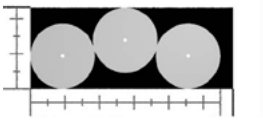
Loading length: 546 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1870 mm



Container: 40‘

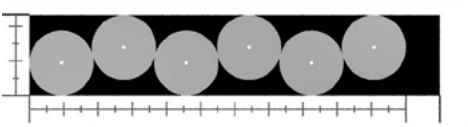
Loading length: 1093.5 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

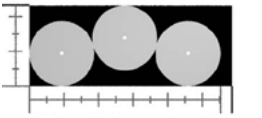
Loading length: 549.6 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1880 mm



Container: 40‘

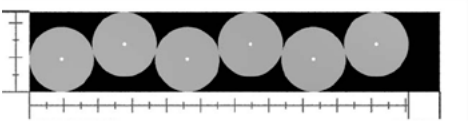
Loading length: 1100.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 553 cm
Loading width: 233 cm
Number of slots: 3

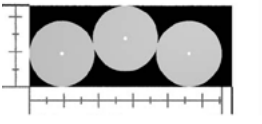
Container: 20‘

Reel diameter 1890 mm



Container: 40‘

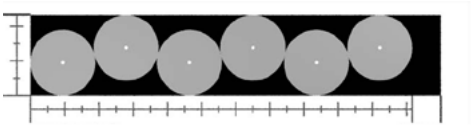
Loading length: 1108 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 556.6 cm
Loading width: 233 cm
Number of slots: 3

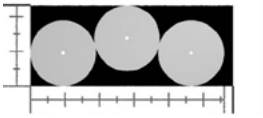
Container: 20‘

Reel diameter 1900 mm



Container: 40‘

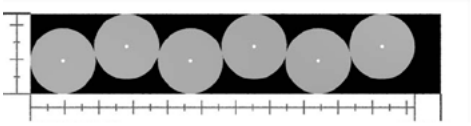
Loading length: 1115.5 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

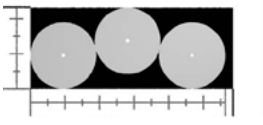
Loading length: 560.2 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1910 mm



Container: 40‘

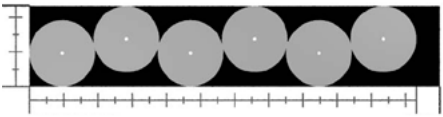
Loading length: 1122.5 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

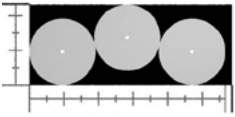
Loading length: 563.6 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1920 mm



Container: 40‘

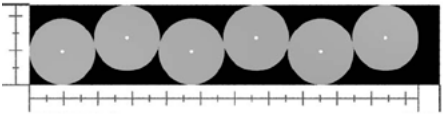
Loading length: 1130 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 567.2 cm
Loading width: 233 cm
Number of slots: 3

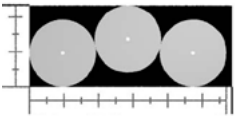
Container: 20‘

Reel diameter 1930 mm



Container: 40‘

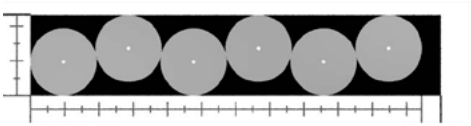
Loading length: 1137 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 570.6 cm
Loading width: 233 cm
Number of slots: 3

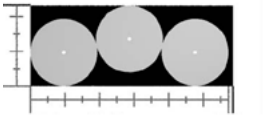
Container: 20‘

Reel diameter 1940 mm



Container: 40‘

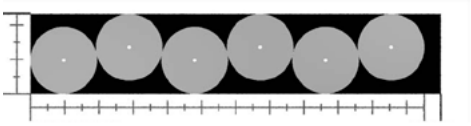
Loading length: 1144 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

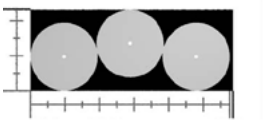
Loading length: 574 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1950 mm



Container: 40‘

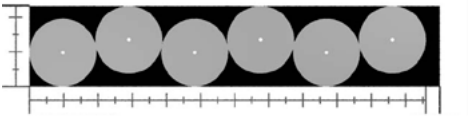
Loading length: 1151.5 cm
Loading width: 233 cm
Number of slots: 6



Container: 20‘

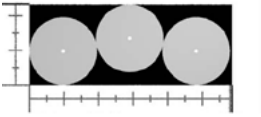
Loading length: 577.6 cm
Loading width: 233 cm
Number of slots: 3

Reel diameter 1960 mm



Container: 40‘

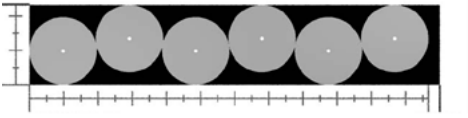
Loading length: 1158.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 581 cm
Loading width: 233 cm
Number of slots: 3

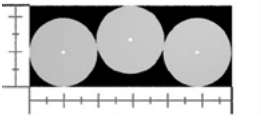
Container: 20‘

Reel diameter 1970 mm



Container: 40‘

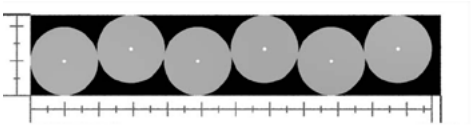
Loading length: 1165.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 584.4 cm
Loading width: 233 cm
Number of slots: 3

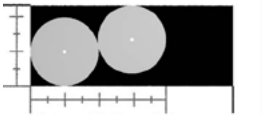
Container: 20‘

Reel diameter 1980 mm



Container: 40‘

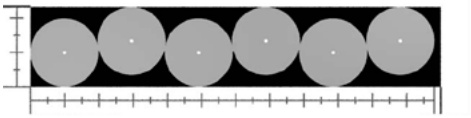
Loading length: 1172.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 392.9 cm
Loading width: 233 cm
Number of slots: 2

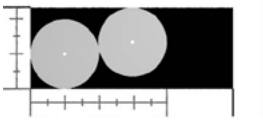
Container: 20‘

Reel diameter 1990 mm



Container: 40‘

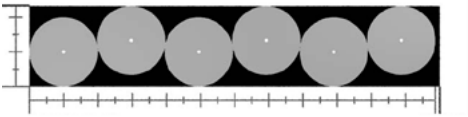
Loading length: 1179.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 395.1 cm
Loading width: 233 cm
Number of slots: 2

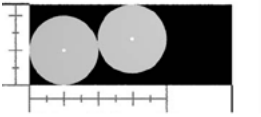
Container: 20‘

Reel diameter 2000 mm



Container: 40‘

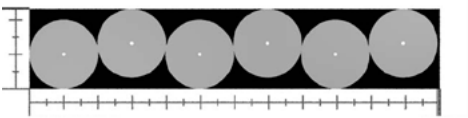
Loading length: 1186.5 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 397.3 cm
Loading width: 233 cm
Number of slots: 2

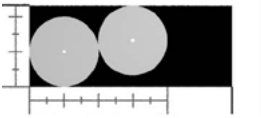
Container: 20‘

Reel diameter 2010 mm



Container: 40‘

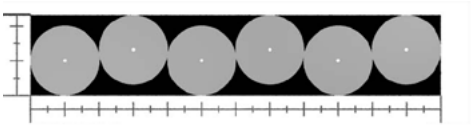
Loading length: 1193 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 399.4 cm
Loading width: 233 cm
Number of slots: 2

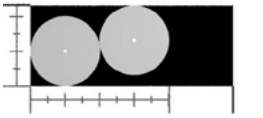
Container: 20‘

Reel diameter 2020 mm



Container: 40‘

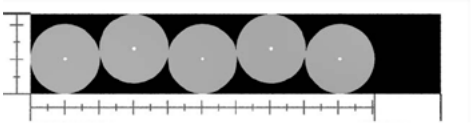
Loading length: 1199.8 cm
Loading width: 233 cm
Number of slots: 6



Loading length: 401.6 cm
Loading width: 233 cm
Number of slots: 2

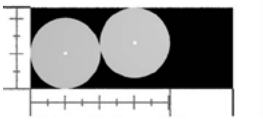
Container: 20‘

Reel diameter 2030 mm



Container: 40‘

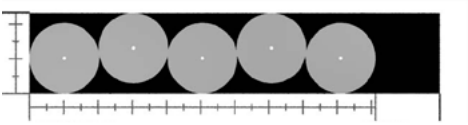
Loading length: 1006.2 cm
Loading width: 233 cm
Number of slots: 5



Loading length: 403.8 cm
Loading width: 233 cm
Number of slots: 2

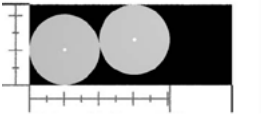
Container: 20‘

Reel diameter 2040 mm



Container: 40‘

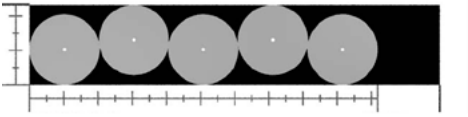
Loading length: 1011.6 cm
Loading width: 233 cm
Number of slots: 5



Loading length: 405.9 cm
Loading width: 233 cm
Number of slots: 2

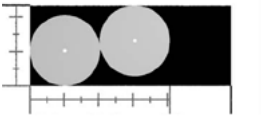
Container: 20‘

Reel diameter 2050 mm



Container: 40‘

Loading length: 1017.4 cm
Loading width: 233 cm
Number of slots: 5



Loading length: 408.1 cm
Loading width: 233 cm
Number of slots: 2

Container: 20‘

Photos:

Page 25 - BUTT GmbH
Page 37, 50, 57, 60 from: Hapag-Lloyd Container Linie GmbH
Page 114, 115, 116, 117 - Hapag-Lloyd Container Linie GmbH,
Page 39 - Verein Deutscher Ingenieure e.V. (The Association of German Engineers)
Page 120, 121, 170, 181, 182, 183 - LOGIPLAN® GmbH
Page 122, 123 (Table) - IFRA- Newsprint and Newsink Guide, published February 1995
Page. 124, 125, 157, 187, 212 - BOLZONI AURAMO GmbH

All other photos: INTAKT Transportberater e. K.

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