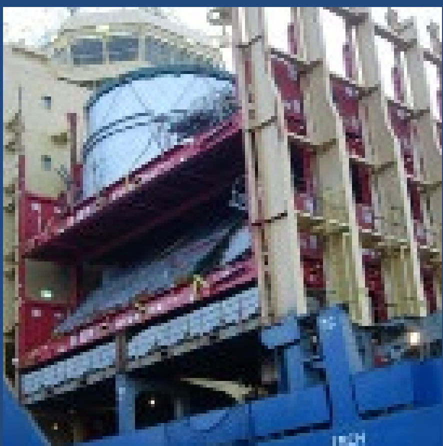
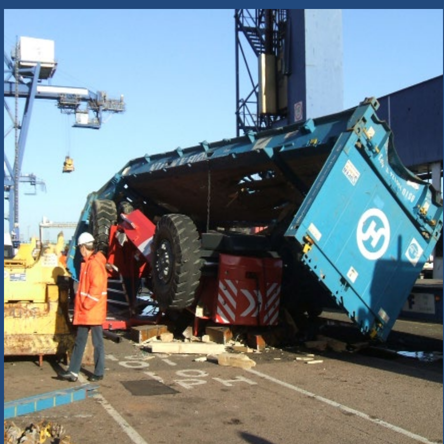
SAFE HANDLING AND OPERATION OF PLATFORM FLATS AND FLATRACK CONTAINERS

INTERNATIONAL SAFETY PANEL BRIEFING PAMPHLET #41

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INTRODUCTION

About this Publication

This publication is one of an extensive series of Briefing Pamphlets and other documents developed by ISP - the Technical Panel of ICHCA International Ltd. The BP series is designed to provide all those involved in cargo handling and transport with practical advice and regulatory updates related to the safe handling and transport of cargoes.

The goal of the BP series, and a prime focus for the work of ICHCA International and the ISP Technical Panel, is to foster a better understanding of how to reduce damage, injury and loss during handling and transport operations, safeguarding people, cargo, equipment and property.

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and Flatrack Containers

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1 | BACKGROUND

This Briefing Pamphlet is one of a number published by ICHCA International on the safe handling of containers and container-related equipment.

While this pamphlet provides information concerning the loading and securing of cargoes on platform flats and flatrack containers, it should not be considered as a definitive guide and ICHCA International strongly recommends that specialist advice is obtained prior to loading and securing cargoes onto these containers.

Platform flats and flatrack containers are generally used to carry oversize or project cargo which cannot be easily loaded into standard box type freight containers or is too long, wide or high to fit.

Platform flats carrying any cargo and flatrack containers carrying oversize cargoes may require specialist handling equipment to lift. Care should be taken when attaching specialist handling equipment.

All platform flats and flatrack containers are designed to carry loads evenly spread over the entire surface of the container with loads spread over the side beams. Some are also designed to carry concentrated loads at the centre (longitudinally).

Some designs of folding flatrack containers permit flush folding of the end walls to enable the unit to be used as a platform flat.

Finally, some designs of platform flats or folding flatrack containers may be used, in combination with one or more identical units, as a temporary 'tween deck providing a strong deck onto which super-sized cargoes (size and/or mass) may be loaded by crane.

For the purposes of this document the term **flatrack** will be used to refer to all designs.

2 | TYPES OF PLATFORM FLATS AND FLATRACKS

There are a number of different designs of platform flats and flatracks. All are classified by ISO as platform-based containers and are further divided into four categories.

2.1 Platform-Based Containers

A platform-based container is a loadable platform that has no superstructure whatsoever but is the same length and width as a container of the same series. A platform-based container may be equipped with top and bottom corner fittings or, as in the case of the units shown in **Picture 1**, with bottom corner fittings and a top plate which simulates the top surface of the corner fitting.

The corner fittings / top plates are located in the same plan view as on series 1 containers so that the same securing and lifting devices can be used. These designs are referred to as "platforms" or "platform flats".

The design of the side beam dictates the maximum carrying capacity of the platform. In general, the deeper (higher) the beam the larger the capacity, although the units shown in **Picture 1** have a maximum gross mass rating of 34,000 kg.

The advent of the flush folding flatrack has reduced the need for these containers but the simple and robust design means that very few of those built will have been taken out of service.

2.2 Platform-Based Containers with Incomplete Superstructures - Fixed Flatracks

Fixed flatracks usually have complete and fixed walls at


PICTURE 1


PICTURE 2

PICTURE 3


PICTURE 4

both ends, but they can be built with four fixed corner posts (see **Picture 2**) or a combination of a complete and fixed wall at one end and fixed corner posts at the other (see **Picture 3**).

Fixed end flatracks are often built for specialist cargoes such as steel coil carriers (as shown in **Picture 3**) rather than general oversized cargoes.

The simple design of the fixed end flatrack means that their life can be quite long, but the end walls are susceptible to damage which often will take the unit out of service. The folding flatrack has generally replaced these units.

2.3 Platform-Based Containers with Incomplete Superstructures - Folding (Collapsible) Flatracks

Folding (or collapsible) flatracks can be supplied with:

- Complete folding ends (see **Picture 4**)
- Free standing folding posts (see **Picture 5**)
- Folding end posts with removable top rails or diagonal bracing or a combination of complete folding and walls plus braced corner post extensions (see **Picture 6**)

2.4 Platform-Based Containers with Complete Superstructures

Platform-based containers with complete superstructures are very rarely seen as the superstructures are easily damaged during loading and unloading processes.

However, steel coil carriers are often supplied with sliding or removable covers (**Picture 7**) and ship's gear carriers (**Picture 8**) could be also considered as a superstructure.

PICTURE 5

PICTURE 6

PICTURE 7

PICTURE 8

3 | LOADING/UNLOADING AND SECURING CARGOES

3.1 Maximum loads that can be carried

All flatrack containers are designed with a maximum gross mass rating, which refers to the maximum combined mass of the flatrack and cargo that can be safely lifted using standard handling equipment.

If the mass of the cargo is approaching the maximum payload capacity of the flatrack, it is essential that the load is evenly distributed over the entire surface of the flatrack deck. Many designs of flatrack are built with the capability of carrying a concentrated load at the centre of the container deck.

The mass of the concentrated load against the footprint varies from design to design and the container owners should be approached to gain advice on the concentrated load carrying capability.

When flatrack containers are used as a temporary ‘tween deck, loads in excess of the rated maximum gross mass may be carried. **Picture 9** shows a number of flatracks positioned across the cells within a ship's hold and oversize and heavy items have been secured onto them.

In these circumstances the flatrack container or containers are positioned into place in an empty state. The super-heavy cargo is then lifted by specialist crane and positioned across the flatrack(s) acting as the temporary ‘tween deck.

The static load capabilities vary from design to design and it is essential that the flatrack container owner is approached to provide this information. At no time should a flatrack with a combined mass greater than the rated maximum gross mass be lifted.

PICTURE 9

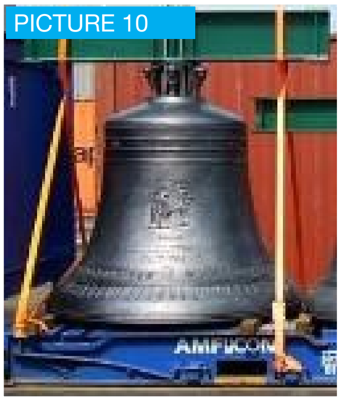
3.2 Load Securement

Platform flats and flatrack containers have been designed and built for the carriage of project type cargoes, often large and cumbersome and certainly not easily moved using traditional handling equipment. Therefore when such cargoes are loaded onto these units, it is important that the cargo is secured firmly and restrained against any possible movement.

Within this section we will explore a number of typical cargoes to discuss the merits or otherwise of the chosen lashing methods. A number of the cargoes will also be discussed in other sections of this document.

The large, out of gauge, bell shown in **Picture 10** has been secured using two webbing straps looped over the bell yoke and tightened on the other side of the flatrack. The bell load is supported on two fairly small baulks of timber which extend over the main beams. It is not known whether the baulks of timber are secured to the flatrack deck or whether there is additional bracing inside the bell's mouth.

PICTURE 10



The following comments can be made about the suitability of the lashing method adopted:

- The shipper appears to be relying on the mass of the bell and the tension in the webbing straps to ensure that the bell does not move. Larger baulks of timber could be used to support the bell and chocks fitted to each end of the timber baulks, either inside or outside of the mouth of the bell
- There appears to be no substantial means for

preventing the bell from sliding sideways should the flatrack be subjected to severe rolling. In addition to the chocks, additional strapping could be attached to both sides of the flatrack and round the opposite side of the bell waist

- The looped webbing may not prevent the bell from falling over if the flatrack is subjected to heavy rolling
- Four straps, two from each side, looped round the bell's yoke and back to the same side would ensure both transverse and vertical stability

Picture 11 shows an in-gauge drum of cable mounted on a 20ft folding flatrack. Drums of cable are generally heavy and have a small footprint, i.e. the area where the loads rests on the deck of the container. The method of securing the load is comprehensive:

- A number of baulks of timber have been used to prevent transverse and longitudinal movement and are shown in **Picture 12**
- The timber baulks with the red ends are supported on the side beams and the load is resting on them. The timber marked "1" has been used to act as a spacer for the main support baulks
- The topmost of the timber baulks marked "3" have been chocked against the rim of the drum to prevent the drum from rolling longitudinally. The timber baulks with the green ends provide additional anti-rolling chocking and also ensure that the timber baulks below do not splay outwards
- The timber baulk marked "2" provide transverse chocking of the drum
- The timber baulks are all nailed together, although the topmost cross timber with the green end is only secured by a single nail at each end. Two more nails driven in at an angle from the far side would also add to the strength of the top timber crosspiece

PICTURE 11

PICTURE 12

PICTURE 13

Picture 12 also shows the detail of the lashing with three wire strops tightened by turn buckles. The outermost two prevent the drum from rolling longitudinally and the central strop tightens the drum down onto the timber base.

Picture 13 shows detail of the wire clamps or "bulldog grips" used to form the eyes to connect the wire strop to the turn buckles, but this only provides 50% of the maximum securing load. If the wire rope lashing is to be homogeneous, four wire clamps should be placed with the "U" bolt on the free end. Single cables with an eye are advisable for relatively long lashings. Shorter lashings should use a loop of cable formed into a sling or double run, again with four wire clamps used to connect the wire cable ends.

Picture 14 overleaf shows an example of an out of gauge (width and height) load secured onto a 20ft folding end wall flatrack. The load appears to be well secured:

- Timber baulks are fitted at deck level to ensure that the load remains centrally positioned on the flatrack (box 1) which should prevent longitudinal movement
- Steel wire strops are fitted through the top lifting eyes and secured to the opposite side at the front and rear of the flatrack (box 2) which should prevent vertical and rotational (transverse and longitudinal) movement
- Two sets of orange webbing straps attached to lashing bars and looped over the top of the load may prevent transverse movement. The effectiveness of these straps is questionable in severe weather conditions due to the acute angle of the strap. Single low level strops from the front/ rear lashing bar to the opposite bottom corner would improve transverse stability
- Single orange webbing strap appears only to hold the blue cover in place

PICTURE 14

3.3 Securing Vehicles

Flatrack containers are often used to transport a variety of large commercial and agricultural vehicles. Such vehicles present their own securing issues.

Picture 15 shows a Massey Ferguson 5465 tractor packed onto a 20ft fixed end flatrack. The tractor has a mass of 5,400kg and is 4.80m high.

The tractor is secured by four steel wire strops each with a turnbuckle. The wire strops are secured using two pairs of opposing clamps as shown in **Picture 13** on the previous page.

Picture 16 shows a small wooden chock that has been placed in front of the rear and behind the front

PICTURE 15

PICTURE 16

tyres to prevent longitudinal movement.

The turnbuckles must pull the tractor body down as hard as possible against the suspension to ensure that transverse and rolling motions do not cause the tractor to move.

The angle of the wire strops will provide little or no resistance against longitudinal movement, which is provided by the chocks under the tyres and the tractor's braking system. The diameter and nature of the tyre means that the chocks are probably too small.

Picture 17 shows a medium-sized van secured onto a 40ft folding flatrack. The lashing method is very similar to that used in **Picture 15**. However the tyre chocks shown in **Picture 18** are far more substantial.

Picture 19 shows a coach secured on a 40ft folding flatrack with the end walls folded down. The coach is out of gauge on the width and since the end walls are folded down would have to be stowed on the top of a container stack aboard a vessel.

Lashing a coach presents its own challenges:

- There are limited number of points on the coach's


PICTURE 17


PICTURE 18


PICTURE 19

chassis that can have lashing strops attached

- The suspension is often quite soft and added to the limited number and positions of attachments it is difficult to attach strops that will compress the suspension

When packing road vehicles, it should be remembered that there are often materials that are considered dangerous, although in relatively small amounts. Petrol and diesel fuel should be drained from their tanks prior to shipment.

Shippers should consult with the shipping lines to confirm whether lubrication and hydraulic oils should also be drained. Lastly batteries should be disconnected or removed entirely for the journey.

3.4 Load Distribution

Paragraph 4.2.4 of ISO 3874 states:

"The cargo shall be distributed throughout the container to ensure that the centre of gravity is kept as central and as low as possible:

- *to avoid excessive tilting;*
- *to avoid overstressing either the container or the handling equipment;*
- *to avoid unacceptable vehicle axle loading;*
- *to avoid lack of vehicle stability;*
- *to avoid unacceptable load concentration*

Eccentricity of centre of gravity for the loaded container varies with the distribution of load within the container; designers of containers and handling equipment should take this fact into account. As an example, when 60% of the load by mass is distributed in 50% of the container length measured from one end, the eccentricity corresponds to 5%."

Picture 20 shows a 20ft folding flatrack packed with three bells. It is probable that the mass of the largest bell exceeds that of the combined mass of the other two bells and the heaviest two bells are positioned within the left hand 4m of the unit.

Therefore approximately three quarters of the mass is distributed in 50% of the container length or an eccentricity of 12.5%. Lifting and positioning by port or ship's equipment will prove difficult.

The use of wire rope strops and cable is gradually being replaced by one-way or ratchet webbing strap systems. Webbing material often will provide improved securing of certain cargoes but care must be taken when the webbing material passed over sharp edges as it is vulnerable and may be easily damaged.


PICTURE 20

4 | PACKING/UNPACKING AND SECURING CARGOES

4.1 General

Flatracks are designed for project cargoes that cannot be easily packed, or indeed fit, into box containers on board the vessel. Many typical loads are out of gauge, either/or both width and height. **Picture 21** shows a 20ft long x 8ft 6in high, fixed end flatrack packed with an over-width and over-height piece of cargo.


PICTURE 21

Over-height cargoes prevent the stacking capabilities of the container being used, and such containers can only be loaded onto the top slot in any stack.

The industry has attempted to resolve the problem of over height cargoes using a number of different designs. The following three designs can be used to increase the internal height of the flatrack allowing out of gauge cargoes to be carried within cells or on deck:

4.2 Post Extenders

Corner post extenders are generally less than 3ft (915 mm) and can be used to increase the "internal" height of a flatrack with the end walls erected (see **Picture 22**) or create a "half height" unit when the end walls are folded down. In either of these two formats the extended flatrack can be top lifted and stacked in cell guides as any other flatrack.

When handling it is important that the post extenders are correctly located in the top most corner fittings, whether the top fitting of the erected end wall or the top of the stub post. **Picture 23** shows the post extender in position and viewed from the front / rear.


PICTURE 22

Flatrack end walls with post extenders fitted must not be folded or erected manually. Use a crane or fork lift truck to carefully raise and lower the end walls.

Picture 24 shows the "interior" view and the screw fitting that is used to tighten the internal clamps. 3mm steel wire is to be used to prevent the screw rotating and potentially loosening the internal clamp. Flatracks fitted with post extenders with the tightening screw not secured in this manner should not be handled.

Handlers of flatracks fitted with post extenders should always confirm that the posts are correctly secured and consider attaching a streamer to all the screw fittings (shown in **Picture 24**) to indicate that they have been checked and are in place.


PICTURE 23


PICTURE 24

PICTURE 25

4.3 HiCube

As an alternative to post extenders, some manufacturers are now building flatracks with longer end walls, increasing the overall height to 9ft 6in (2,896 mm). **Picture 25** shows a number of folded HiCube flatrack containers.

These units are not easy to differentiate from standard (8 ft 6in) high units, however the yellow and black striping shown in the picture indicates the additional height. The size Type Code (as defined in ISO 6346) will also have a "5" as the second digit, for example "45P3".

HiCube folding flatrack containers can be handled in exactly the same way as all folding flatracks.

4.4 Super Rack

"Super Rack" and its bigger version "Heavy Super Rack" was developed in 2001 to provide a solution for stacking flatrack containers carrying over height, and often heavy, cargoes in cells without the need to lose the container slots above them.

The Super Rack is a height adjustable flat rack providing four incremental height steps from 9ft 6in high to 13ft 6in high. The tare is approximately 6 tonnes and it has a rated maximum gross mass of 44 tonnes.

The Heavy Super Rack is also a height adjustable folding end flatrack providing four incremental height steps from 9ft 6in high to 13ft 6in high.

The tare is approximately 10.9 tonnes but the designers report that it has a maximum gross mass of 150 tonnes.

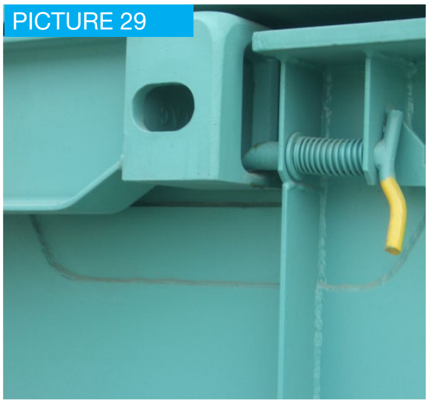
Picture 26 to **Picture 28** show the advantages of the Super Rack. Flatracks carrying over height cargoes can be lifted using standard container handling spreaders (**Picture 26**) and they can be stowed in a cell, or on deck and other containers, not just other flatracks, can be stowed above.

PICTURE 26

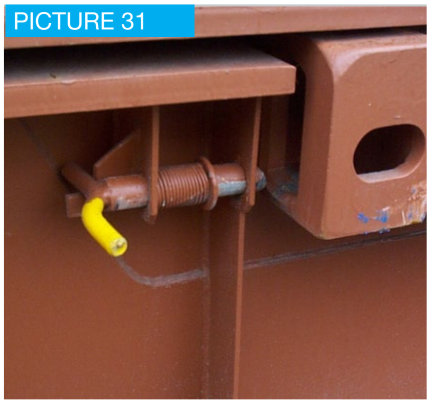
PICTURE 27

PICTURE 28

5 | FLATRACK OPERATION


PICTURE 29


PICTURE 30


PICTURE 31


PICTURE 32


PICTURE 33

PICTURE 34

5.1 Overview

There are a number of different designs of folding flatrack dating back to the earlier times in the flatrack history and produced to meet the specific requirements of the cargoes being carried at the time.

The erection and collapsing of the end wall or posts varies and it is best to consult the manufacturer's instructions for their operation.

However the expansion in the folding flatrack industry in the last ten years has been limited to the manufacture of the flush folding design of which there are two main designs, distinguishable by a round locking pin or a rectangular locking pin. The operation of erection and collapsing the end wall is basically the same and the safety points identical.

In addition to the standard flush folding flatracks there are a number of specialist designs to transport specific cargos, such as cars and one particular design, the "Auto Rack" is included in this operation section as an example of these specialist designs.

5.2 Head Lock

When erecting an end wall, the folded end walls will need to be unlocked. Again there are two general designs: a spring loaded pin that is rotated to lock open (**Picture 29**) and a swinging L shaped gravity lock (**Picture 30**).

On some designs there are two headlocks per end wall, one per side per end, while in others there is only one head lock per end and these will be on opposite sides of the flatrack.

The spring loaded head lock pin has an added advantage over the gravity lock in that when it is held open the handle protrudes from the side of the beam and can be seen from the front or rear. Thus it would be possible for a driver to see that the head lock is not engaged from the wing mirror (see **Pictures 31** and **Picture 32**).

The gravity lock on the other hand requires a positive action to hold the lock open during the erection of the end wall, but thereafter it hangs free and when the end wall is collapsed it should automatically engage.

There are some designs of flatrack which have adopted the gravity lock and which have also added a small length of chain to hold the lock open. The practice of holding the gravity lock in the open position will increase the risk of the lock not engaging with a potential catastrophic failure while being transported.

It would, of course, be possible to see that the gravity head lock is not engaged from the side of the container but impossible to see from the ends.

The consequence of failing to secure the end wall using the head locks can be seen in **Picture 33** and **Picture 34** opposite. Here, an end wall lifted when being driven through a road tunnel, resulting in the tunnel being closed for two days. It is essential that the operation of the head locks is regularly checked. Section 9.2 also covers securing the end walls for transporting nested flatracks.

5.3 End Walls

End walls are, by design, heavy and therefore should be treated with care when erecting and collapsing them. mAt least two operatives, one per side should be used when erecting and collapsing the end walls and they should stand clear at either side of the deck (see **Picture 35**).

At no time during the erection or collapsing of the end walls should a person stand on the flatrack deck while assisting the operation.

Fork lift trucks have been used to lift the end walls and this practice is acceptable, however care must be taken to ensure that the tines do not damage the end wall panel or that the end wall does not slip off the tines during the operation.

When collapsing an end wall the safest practice is to lower the end wall by the use of operatives on both sides of the flatrack. However in some areas it has been known for the end wall to be pushed and allowed to fall unhindered.

While there is little chance of damaging the flatrack or end wall, care should be taken that operatives are standing well clear and that they are prepared for the sudden and loud noise that will occur.

5.4 End Wall Lock Bolts

Picture 36 and **Picture 37** show the two designs of end wall locking pin, **Picture 36** shows the rectangular shoot bolt in the closed position and **Picture 37** shows the round hammer bolt in the open position.

Both designs work in the same way. When the end wall is erected the bolt is pushed into the hinge plate to prevent it from rotating. To prevent accidental withdrawal the bolts both have a means of holding them in either the open or closed position.

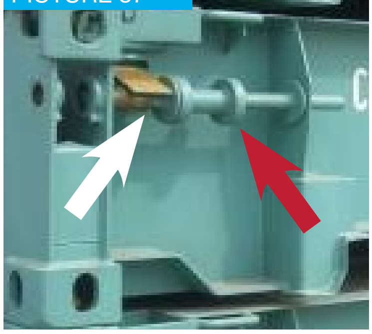
Picture 36 shows a hinged bar (arrowed) that fits into the two cut outs. **Picture 37** shows the lock plate (white arrow) again hinged that locates either side of the circular disc immediately to its right. The dumbbell shaped object (red arrow) is the hammer that is used to “hammer” the bolt in and out.

Until both of the bolts on either side of the end wall are fully

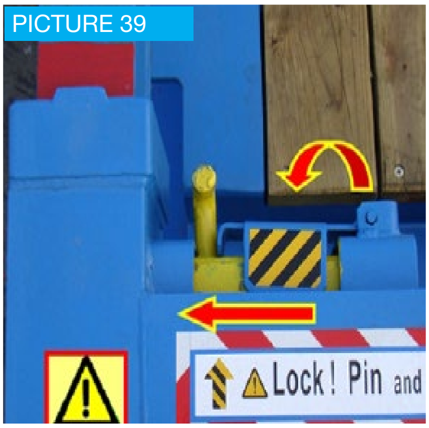
PICTURE 35

PICTURE 36

PICTURE 37



PICTURE 38



PICTURE 39

PICTURE 40

engaged and the locking bar or plate located, the flatrack should not be moved and care should be taken in their immediate vicinity.

Where it is impossible to correctly locate the locking bar or plate such as shown in **Picture 38**, the container should not be moved or utilised.

5.5 Super Racks

The end walls of the Super Rack are considerably heavier than those of the standard height or HiCube height flatracks. Consequently the erection of the end walls and securing the extension posts requires special attention.

Picture 40 shows the end wall of a Super Rack with the extension posts fully extended. The Post Securing Pin is shown in more detail in **Picture 39**. Before lifting or stacking, it is essential that the pin (yellow) is fully located and that the yellow and black lock plate is in place as shown.

The extension posts should only be adjusted when the end wall is in its partial erected position and supported by the End Wall Support (arrowed in **Picture 41**). A fork truck should be used to lift and lower the end wall at all times.

Older designs of the Super Rack are fitted with diagonal braces as shown in **Picture 42** opposite.

The diagonal braces must also be secured and the pins pushed through the key-way holes. The handle part of the pins should also be rotated so they hang downwards to ensure that the key-way spine is not aligned with the slot.

Failure to check that the pins are properly engaged before lifting or stacking can result in the extension posts pulling fully out of the end walls.

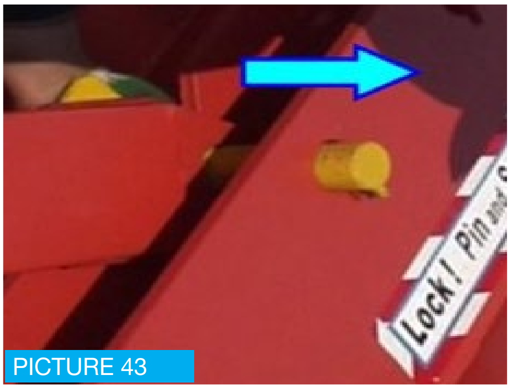
Pictorial Operations Manuals are available on the Super Rack website.

5.6 Auto Racks

A recent innovative idea that has been introduced into the world of containerisation is a transportation frame called an 'Auto Rack'. At first appearance this appears

PICTURE 41


PICTURE 42



PICTURE 43

to be an ingenious combination between a flat rack and a car transporter and initial trials seem very successful. **Picture 44** shows two Auto Racks one loaded and the other, in front, being folded. **Picture 45** shows a car being loaded onto the bottom deck of the container.

Ports and container terminal operators should be aware of the additional responsibilities that emerge from operating such equipment with their own operatives, particularly as lifting equipment is involved.

The operators of this equipment have taken a proactive step to ensure that where this equipment is used, all operatives have been trained and are competent.

This pamphlet does not include any instruction with regard to the training or operation, but notes that on such specialist pieces of equipment improper erection and operation may result in a serious accident.

In Europe, such equipment falls within the scope of:

1. The Amended Use of Work Equipment Directive (AUWED - 95/63/EC)
2. The Machinery Directive (89/392/EEC and 91/368/EEC)

In the USA, such Auto Rack equipment falls under the scope of CFR 29: part 1919 for material handling equipment.

It is not the intention of this pamphlet to enter into legislative detail of any one country.

In order to ensure legislative compliance, national and local regulations must be consulted.


PICTURE 44


PICTURE 45

6 | MAINTENANCE

6.1 Head Locks

The role of the head lock in retaining the end wall in the folded position while being transported, particularly by road or rail, is of paramount importance. They must be able to fully engage with the top opening on the end wall top corner fitting.

Both designs are simple and require little maintenance. However, both designs are subject to corrosion damage and may become stuck in the open position, in which case their effectiveness is eliminated.

Operators who are preparing a nested stack for shipment should check the operation of the head locks prior to forming the nested stack.

Gravity head locks must be able to swing freely and the spring loaded pin should spring back to the closed position when released. If either does not, then the container must not be transported while on the top of a nested stack. It may be placed at a lower position in the stack or the end wall, held down by strapping.

PICTURE 46

6.2 "U" Shaped Top Plates

The "U" shaped top plate of the flatrack stub corner post as shown in **Picture 46** has to provide much of the functionality of, and compliance with, the ISO 1161 top corner fitting.

The methods for lifting flatracks containers are discussed in section 7, and although ISO 3874 does not show any allowable or possible lifting methods for loaded flatracks with the end wall folded, there are many cases shown in this pamphlet and elsewhere to show that a folded flatrack can be lifted by the "U" shaped top plate using either chains or an extension frame.

Therefore the "U" shaped top plates must be capable of withstanding the loads associated with these types of lift. Recently built flatracks will all have been subjected to a top lift test identical to that made on all other freight containers.

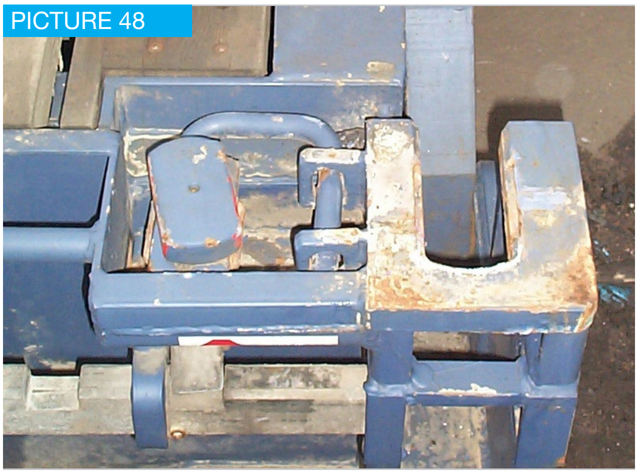
PICTURE 47

The nature of the "U" shaped top plate means that the twistlock or connector can move longitudinally with the consequence that the lifting forces could be borne near the open end of the plate and the faces turned up or damaged. If damage is seen where the plates are bowed or bent upwards, especially towards the open end of the "U"shaped top plate, the container should be stopped from further transport and the plate replaced.

A design of "U" shaped plate is shown in **Picture 47**. The top face of the plate has a recess cast into it which permits the flip over lock connector to be located. This design provides greater security for preventing longitudinal movement, but the recess presents handling risk.

Where the actuation pin coincides with this recess there is a risk that the spreader twistlock will not engage or even more problematical; disengage. Where flatracks are found with this design of "U" shaped plate, a spacer plate (see 7.1) should be used.

PICTURE 48



PICTURE 49

6.3 Flip Over Locks / Interconnectors

The flip over locks (flip-locks) are an essential element in the formation of nested stacks and it is imperative that these interconnectors are adequately maintained.

There are three elements to the maintenance required:

- The flip-locks themselves must be maintained so that they can be twisted by hand through 90°
- The flip-lock location bar must be able to rotate the flip lock from the flip-lock housing into the "U" shaped top plate and this should prevent longitudinal movement of the flip locks
- The flip-lock housing should be correctly shaped and intact

The pictures on this page and overleaf show two examples of satisfactory housings and connection bars (**Picture 48** and **Picture 49**) and two examples where there is sufficient damage to prevent their safe use (**Picture 50** and **Picture 51**).

PICTURE 50

Picture 50 shows a flip-lock with a bar that cannot be held in place to prevent longitudinal movement as the fixing brackets have been broken (arrowed).

Picture 51 overleaf shows an example of a flatrack with the end walls erected (thus the flip-lock is not required and is stowed in its housing). The housing has been severely distorted downwards and it is possible that as a result of this damage the flip-lock will not rotate correctly to locate into the "U" shaped top plate aperture.

Whenever a nested stack of containers is being formed, the operator must thoroughly examine the flip-locks to ensure that:

- There are no signs of excessive corrosion
- The flip-lock can be twisted by hand
- There is some positive stop/resistance to prevent the flip-lock from twisting without any force exerted upon it
- Flip-locks are properly attached to the main frame assembly

Only flatrack containers that fully comply with the above conditions can be included in a nested stack. Units that do not fully comply may be included in the nested stack as the top unit since the flip-locks are not used during the lifting or securing actions.

6.4 Hinges

The two main designs for folding flatracks have slightly different hinge plates. One is a fabricated plate while the other is a solid plate. The latter design does not appear to have many issues relating to maintenance of the hinge plate, while the fabricated design has been known to fail, especially in the vicinity of the round locking bolt aperture. If any cracking is seen on either designs of hinge plate, the container should be stopped from further transport unless it is being handled with the end wall folded down.

Many of the designs of folding flatrack will have grease nipples associated with the hinge pin and these must be regularly maintained.

If cracks are seen around the hinge pin bosses or on the main beam then the flatrack container should not be packed with cargo.

PICTURE 51

6.5 Locking Pins

End wall locking pins must operate without sticking and the retaining locking bar or plate should operate effectively. If any of the four locking bolts do not operate or engage fully so that the locking bars can be correctly located, the flatrack should not be operated with the end walls erected.

6.6 End Walls

When the end walls are erected, the only safe lifting process is to use a top vertical lift. Using angled slings is almost certainly going to cause the end wall to bend inwards thus preventing top-lift spreaders from properly engaging.

In some cases the distortion is obvious but in many cases one corner may be distorted and this may not be so easily seen.

If there is any doubt about the straightness of the end wall posts, no lift should be made until the end wall has been checked.

Many flatrack cargoes will be approaching the maximum permissible payload and it is therefore very important that the components that are subjected to the full lifting forces are properly inspected for damage and cracking before packing commences. This includes:

- The top corner fittings and the welded joints connecting the corner fittings to the end wall posts
- The connection between the hings blade and the bottom of the corner posts
- The post extender socket at the top of the fixed portion of the Super Rack end wall (see also Section 7.2)

7 | LIFTING PLATFORMS AND FLATRACKS

7.1 Platforms and Flatracks with Ends Folded Down

ISO 3874 states that platforms, platforms with complete and folding ends, folded condition and platforms with folding free standing posts, folded condition:

- May **not** be lifted by top spreader when loaded (platforms may be lifted when loaded with extensions) but both platforms and flatracks may be lifted when unloaded
- May **not** be lifted by top slings when loaded but may be lifted when empty
- May **not** be lifted by bottom slings when loaded (except platforms) but both platforms and flatracks may be lifted when empty
- May **not** be lifted by side lift when loaded or empty
- May **not** be lifted by end lift when loaded or empty
- May **not** be lifted by fork lift truck when loaded or empty (30ft and 40ft) but 20ft platforms and folded flatracks may be lifted by fork lift truck when loaded or empty

These prohibitions in ISO 3874 appear to show that there is no approved or possible method for lifting flatracks with the end walls folded down. However in practice, container handling organisations have devised procedures that permit lifting flatracks with the end walls folded down using the "U" shaped top plate.

7.1.1 Top lift methods

Top lift methods can and are used, but in all cases when handling flatracks with folding end in the folded condition, special care must be taken.

The design of the top plate on the stub post (short corner post on the platform frame) of the folded flatrack is "U" shaped to enable the hinge blade geometry to exert a vertical force from the erect end wall post and the sub post.

Figure 1 shows the plan of the stub post top plate with the container continuing up and to the right, effectively the bottom left corner of the flatrack.The open (inner) end of the "U" shaped plate presents the container handler with a handling risk.

From this figure it can be seen that a twistlock can slide out if pushed towards the other end of the flatrack (i.e. up the page) it is important to remember this fact when deciding the lifting method to be employed.

When being lifted as part of a nested stack it is of paramount importance that the flip-lock is restrained so that there is no opportunity for longitudinal movement

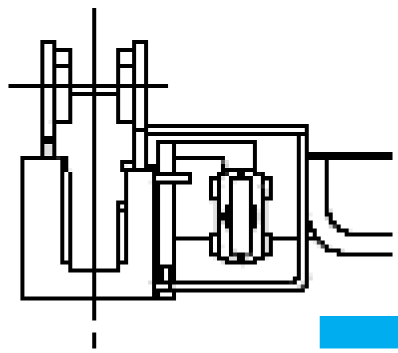


FIGURE 1

(see also Section 6.3). If the bar used to attach the flip-lock component to the flatrack is not secured in its housing or if there are weld defects, stress cracks or damage and the flip lock assembly can move longitudinally, the flatrack should not be included in a nested stack except on the top. It is also important that when handling a nested stack only the interconnection devices permanently attached to the flatracks should be used to connect them.

A container lifting spreader's width is often adjusted by hydraulic pressure and once at the required width it is not locked in any way, so should any force be applied to one end of the spreader then it is possible for the width to shorten.

In the case of flatracks with the ends folded down this slight shortening of the spreader length may result in the spreader's twistlocks at one or both ends disengaging from the "U" shaped top plate with disastrous effect.

7.1.2 Nested flatracks

Paragraph 6.2.4 (Top Lift Spreaders) and 6.4.4 (Bottom Lift sling) of ISO 6384 states:
"Folding platform based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668."

There have been many reports of folded flatracks being lifted as a nested stack by the crane's spreader from the vessel to the dock, that have separated during the operation, allowing one or more flatracks to fall to the dock. In one instance, the driver of the tractor/trailer sustained serious injury.

In view of these reports and the risk of the twistlock sliding out of the "U" shaped top plate, terminal operators may decide that lifting with a top spreader should be limited to shore side movements i.e. from the dock to a road or dock transport unit (truck) or vice versa only. If the flatrack units are designed with fork pockets, using a fork lift truck is preferable.

In that case they may also decide that when lifting from the dock to the ship or ship to the dock, the nested flatrack units should be lifted as break bulk cargo and lifted from the bottom corner fittings of the bottom unit with appropriate, safe, loose lifting equipment.

7.1.3 Extension frames

Platform flats, flatracks with the end walls folded, or flatracks with fixed or erect folded ends (but carrying an over height cargo) may require the use of an extension frame which can be secured onto the spreader and twistlocks in the legs to lift the flatrack (see **Picture 52**)

When using this sort of equipment it is very important that:

- The actuation pins are not located above the open face of the "U" shaped top plate thus preventing the twistlock from engaging. If this is the case plates (See **Picture 53**) can be placed on the U shaped plate before the extension legs are positioned and connected
- The legs are kept vertical and that longitudinal movement of the legs relative to the flatrack could result in the twistlocks sliding out of the "U" shaped top plate

7.1.4 Top slings

It may not be possible to use extension frames, in which case slings will be required. For platform flats and flatracks it is essential that the slings are vertical and that they are not angled together by even the smallest amount, especially for the folding flatrack.

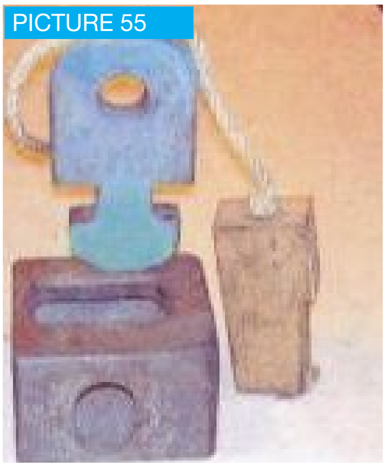
There are a number of methods by which slings can be applied to the top plate of a platform flat of folded flatrack and these are discussed below:

- ISO "T" piece – a device that can be fitted into the top aperture of a corner fitting and which is then turned through 90°. The device will also have a cam that prevents the "T" piece from turning (see **Picture 54**)
- "T" piece – a simpler design than the ISO "T" piece where a wooden block is hammered in to

PICTURE 52

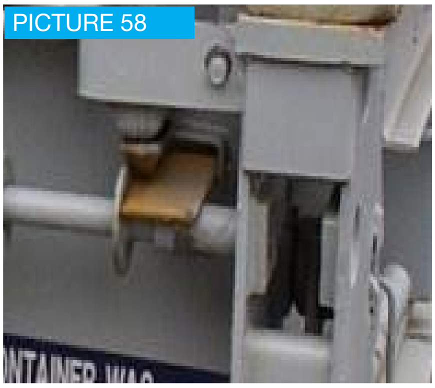

PICTURE 53


PICTURE 54


PICTURE 55


PICTURE 56


PICTURE 57


PICTURE 58


PICTURE 59

retain the device in and at right angles to the axis of the aperture (see **Picture 55**)

- When used on the folded flatrack the two "T" piece designs (**Picture 54** and **Picture 55**) will have the same opportunity to slide out unless the wooden block is of sufficient size that it can fill the gap between the hinge blade and the "T" piece. In both cases there is a risk of the "T" pieces sliding out so extreme care must be taken when employing these methods
- Hook – which can be inserted through the top aperture and out of the front aperture / opening (see **Picture 56**)
- The hook design is the most reliable of the top lifting sling options so long as the "U" top plate is both strong enough to take the load and that the hook can be fitted. Some designs of folding flatrack have a flat plate directly below the "U" shaped plate that would prevent the hooks use.
- **Picture 57** shows an example where the front aperture has been strengthened at the top for hook attachment, whereas the stub post shown in **Picture 58** is not suitable for hook attachment
- Shackle – very rarely used due to the size required for the shackle's mouth

7.1.5 Bottom slings

One of the common methods for lifting packed flatracks and platforms is by the use of bottom slings. This practice is perfectly safe and is the preferred method of lifting especially for stacks of folded flatracks[1] or nested stacks.[2] However handling restrictions, such as being placed in a cell or narrow stack where there is side access, may prevent this method from being used.

Picture 59 shows three tractor units loaded onto a 40ft folding flatrack. The plan and height of the load prevents the use of the extension frame (**Picture 52**) so the slings are attached to the four bottom corner fittings.

7.1.6 Side lifting

Because many depots operate using side lifting equipment, folded flatracks could not be handled

[1] A "stack" of folded flatracks refers to a stack of a number of flatracks up the maximum gross mass of the bottom flatrack and which are connected by loose twistlocks that are not an integral part of the flatrack.

[2] A "nested stack refers to a stack of flatracks up to a maximum height of 8ft. 6 in. which are connected together by an interlocking system that is an integral part of the flatrack.

PICTURE 60


PICTURE 61


PICTURE 62

except where there was a facility for "grappler" arms. Therefore manufacturers have included fork pockets on all lengths of flatrack, but have marked those on the longer lengths with a decal that informs the operator that they should be only used for when the flatrack is empty (similar to **Picture 60**).

ISO 6346 permits the lifting of loaded 20ft units. However operators must take care:

- If the cargo's centre of gravity is eccentric then there is a risk of the fork truck toppling over when cornering
- If the cargo's mass is approaching the maximum permissible load
- If the cargo overhangs the side beams of the flatrack

When handling empty 40ft flatracks with a fork lift truck care must be taken when cornering or handling on uneven surfaces.

Stacks or nests of flatracks can be handled in shore based operations using fork lift trucks. This is a preferred method (see **Picture 61**).

Empty platforms, single flatracks with the ends folded down or nested stack of flatracks with the ends folded down would be handled by normal top lift spreaders.

7.2 Folding Flatracks with Ends Erect and Fixed End Flatracks

According to ISO 3874, platforms with complete and fixed ends, fixed free standing posts, complete and folding ends, erected condition and folding free standing posts, erected condition:

PICTURE 63

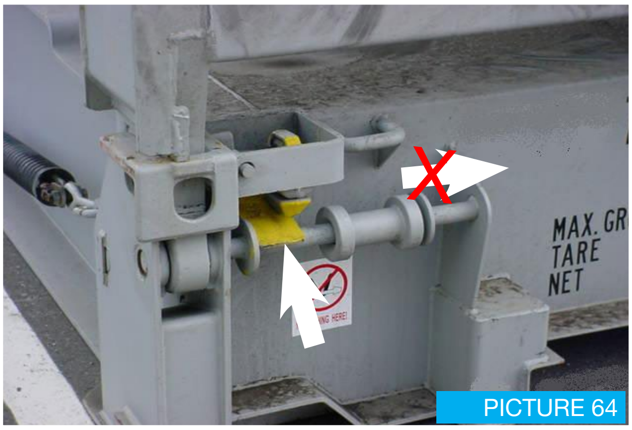
- May be lifted by top lift spreader when loaded or empty
- May **not** be lifted by top lift sling when loaded or empty
- May be lifted by bottom lift sling when loaded or empty
- May **not** be lifted by side lift when loaded (30ft and 40ft), but a 20ft unit may be lifted loaded when the bearing surface is on the end post assembly and all lengths may be lifted by this method when empty
- May **not** be lifted by end lift when loaded or empty
- May **not** be lifted by fork truck when loaded or empty (20ft and 40ft) but a 20ft unit may be lifted by a fork truck when loaded or empty

It is to be remembered that there is no difference made within the standard between "not allowed" and "not applicable". Therefore some of the cases where "may not" is used may refer to "not applicable".

Flatracks with fixed or erect end walls can generally be handled like any box type container, but special care must be taken to ensure that the lifting forces applied to the top corners are always vertical.

The top corner fittings should be fully compliant with ISO 1161 so that there is no risk of the twistlock sliding out as mentioned previously (see **Picture 62**). Where the flatrack is carrying an oversize load, a top frame or lifting slings may be used. Again, the lift angle must be vertical.

Before undertaking any lift of a folding flatrack with the end erect, the operator must ensure that the sliding bolt or pin is correctly engaged and that the safety lock will retain the bolt or pin in place. **Picture 63** shows the slide pin in the retracted position and the safety plate in place.



PICTURE 64

Picture 64 shows the pin in the engaged position and the yellow plate (arrowed) is preventing the pin from moving to the right.

Picture 65 shows an example where the pin is not complete and there is no means of retaining the pin in place. This flatrack is unsafe and should not be lifted.

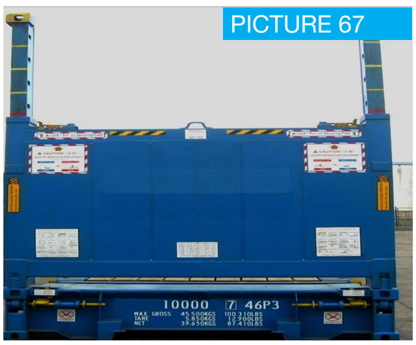
In addition to checking the slide bolt or pin at the bottom of the end wall the specialist over height flatrack container, the "Super Rack", needs additional checks to the pins that retain the extendable posts.

Picture 66 shows one design of the Super Rack with diagonal braces while **Picture 67** shows a later veersion without them. In both designs the integrity of the design when lifting is achieved by properly engaging the post locking pins to all four corners (see **Picture 68**).

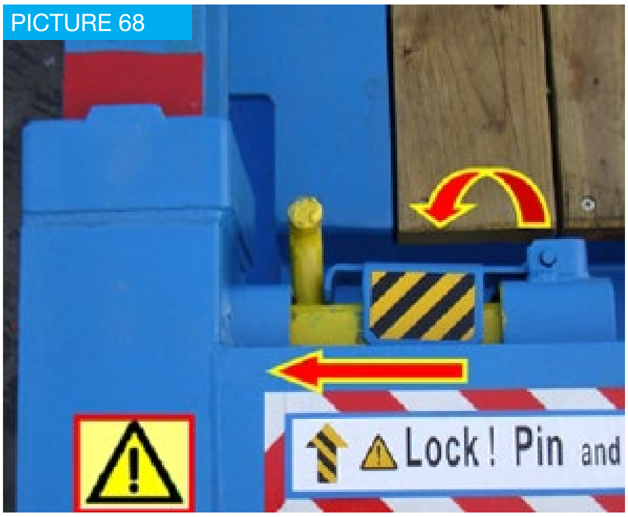
It is essential that these pins should be engaged whether the extension posts are raised or not.


PICTURE 65

PICTURE 66


PICTURE 67

PICTURE 68



However many designs of flatrack are not suitable for lifting using angled slings attached to the top of the stub posts. Therefore it is recommended that unless the flatracks clearly states that the flatrack may be lifted by angled slings that this practice is not adopted for packed flatracks.

Under certain circumstances ISO 3874 allows side lifting of packed 20ft flatracks. However if the cargo mass is approaching the maximum permissible or over hangs the side beams this method of lifting should not be used. In general, this practice is not recommended.

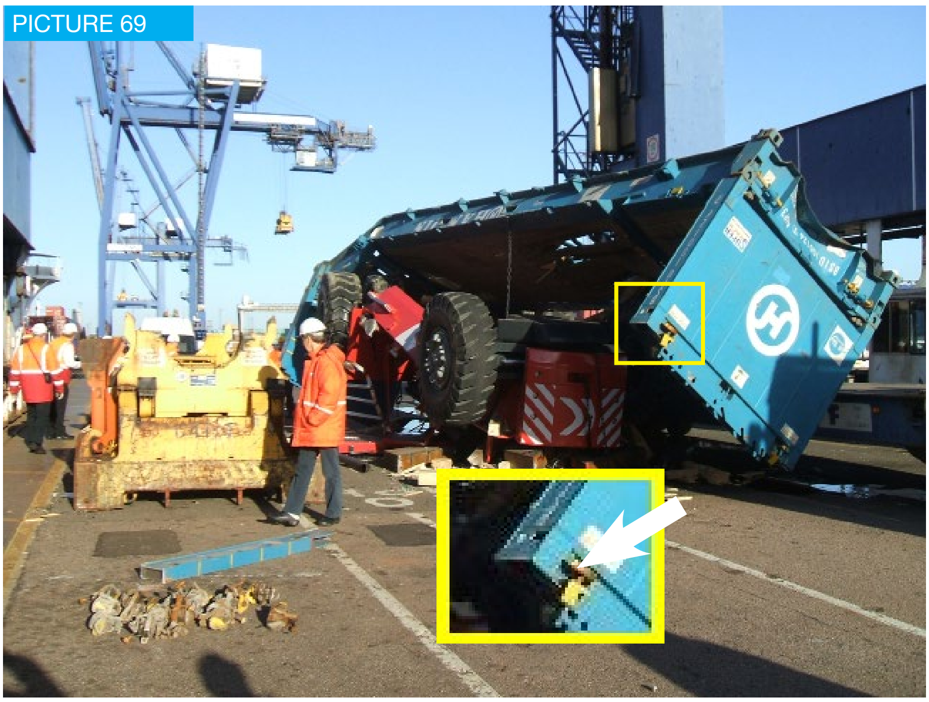
The accident shown in **Picture 69** overleaf may appear to be the consequence of the pins not being engaged. However, the real cause was the failure of the end wall top connectors at the far end of the flatrack. Although it cannot be clearly seen in the picture, the failure occurred at the join between the post and corner fitting and a similar join is indicated by the arrow in **Picture 68**, also overleaf.

Many flatrack cargoes will be approaching the maximum permissible payload and it is therefore very important that the components that are subjected to the full lifting forces are properly inspected for damage and cracking. It is essential that when engaging the post locking pin the joint is thoroughly examined for cracks and signs of damage.

PICTURE 70

Packed and empty flatracks may be lifted by slings attached to the bottom corner fittings. Unfortunately when loading or discharging from a restricted cell or stack it may not be possible for access to the sides of the flatrack in order to engage/remove the side shoes. Therefore one design includes an aperture on the inside of the corner post into which a side shoe can be placed and the container then lifted using an angled sling (see **Picture 70**).

PICTURE 69



8 | NESTING PLATFORMS AND FLATRACKS

8.1 Methods

There are a number of different types of interlocking systems for flats that have been approved and certified by classification societies or other approved bodies. The operation of three of the most common systems is described below.

8.2 Flip-Locks (Flip Over Twistlocks)

This is the most common method for connecting platform flats and folding end wall flatracks together into a nested stack.

The advantage of this system is that all designs of flats and flatracks built using this system can be carried in a common nested stack, as flip-locks engage into any container with ISO bottom corner fittings.

Flatrack containers built that use this system will have a twistlock that is housed adjacent to each corner fitting (see **Picture 71**).

It is essential that the interconnector used to connect a nested stack is one that has been tested and one that is retained from longitudinal movement. Where there are signs that the connection bar between the flip-lock housing and the flip-lock itself has been damaged or broken it is possible that it will not satisfy the longitudinal movement restraint.

Picture 72 shows a design of interconnector used on some specialist equipment that also cannot be prevented from longitudinal movement when used in conjunction with a “U” shaped top plate.

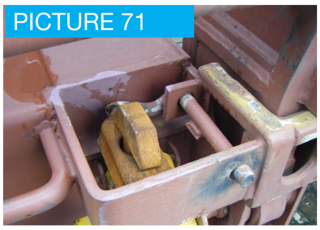
It is important that the flip-locks are of a design that is suitable for the purpose for which they are intended. All flip-locks are subjected to a testing regime at the time of manufacture and it can be taken that a flip-lock is suitable if the flip-lock, attachment bar and locating means are original.

Where flip-locks are easily replaced, such as shown in **Picture 72**, or where there are signs that the flip-lock has been replaced, then each one should be marked with the container serial number and ideally marked prior to painting. New flip-locks should also be stamped with a safe working load that is in excess of seven times the tare of the flatrack.

The flip-lock is retained by a bar that allows it to be lifted out of its housing and placed into the adjacent corner fitting. **Picture 73** shows a flip-lock being lifted from its housing and **Picture 74** shows it placed into the adjacent corner fitting.

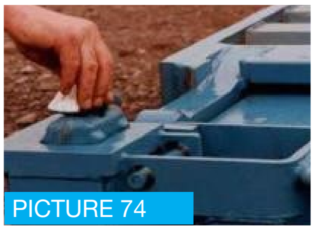
To make up a nested stack:

- Lift each flip-lock from its housing and place it into the aperture in the short corner post top corner fitting see **Picture 73** and **Picture 74**.
- Position another flat on top with the flip-lock engaged in all the bottom corner fittings.
- At each corner lock the top flat in place by manually


PICTURE 71


PICTURE 72

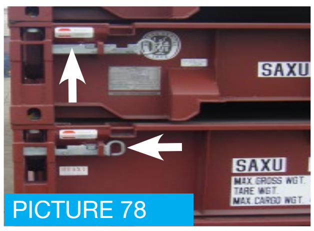

PICTURE 73


PICTURE 74


PICTURE 75


PICTURE 76


PICTURE 77



PICTURE 78

rotating the bottom block of the flip-lock on the lower flat through 90 degrees. **Picture 75** (p.27) shows the flip-lock in the unlocked position when viewed from the end. **Picture 76** (p.27) shows an operative turning the flip-lock and **Picture 77** (p.27) shows the flip-lock in a closed position

- Repeat the process with each additional flatrack

The slide bolts arrowed in **Picture 78** (p.27) are not part of the interlocking mechanism for the stacked flatracks. Their purpose is to lock the end wall of a flatrack into the upright position. When transporting a nested stack, the slide bolts can be in the open position (see upper arrow) or the closed position (see lower arrow).

8.3 Link and Shoot Bolt

Flatracks with link and shoot bolt interlocking devices are usually equipped with locating spigots at diagonally opposite corner posts (2 per unit) in addition to the 4 links and shoot bolts. The spigots can be manually lifted from within the corner post and rotated 180 degrees to lock. The spigots prevent the interlocked unit becoming sloppy, as they engage with the bottom corner fittings of the flat above and hold the unit rigid.

To make up an interlocked unit:

- Lift out the spigots, rotate and lock them in position (**Figure 2**)
- Position another flat on top with the spigots engaged in the bottom corner fittings of the upper flat

At both corners:

- Release the interlocking shoot bolt safety catch on the upper flat (**Figure 3**)
- Raise the link from the lower flat and push the shoot bolt through the link and into the corner casting of the upper flat (**Figure 4**)
- Re-engage the safety catch at the engaged location (**Figures 5**)

Repeat the procedure with each additional flat.

8.4 Stacking Cone and Shoot Bolt

Stacking cone and shoot bolt interlocking devices are positioned at all four corners of a flat.

To make up an interlocked unit, at each corner:

- Lift each corner cone from the storage pocket and slide it into the slot provided in the top corner fitting of the short corner post (**Figure 6**)
- Position second flatrack onto the cones of the lower unit
- Release the interlocking shoot bolt safety catch
- Push the shoot bolt through the cone and into the corner fitting (**Figure 7**)
- Re-engage the safety catch at the engaged location
- Repeat the procedure with each additional flatrack

8.5 Interconnection Using Twistlocks

These are designs of flatracks and particularly of platform flat that do not have built in interconnection devices.

FIGURE 2

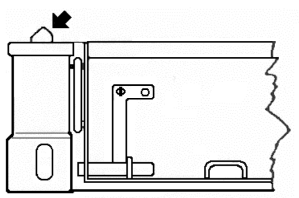


FIGURE 3

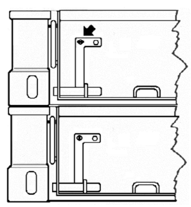


FIGURE 4

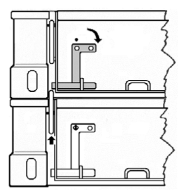


FIGURE 5

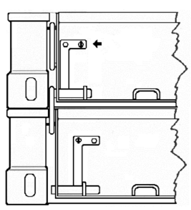


FIGURE 6

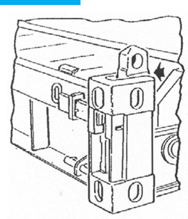
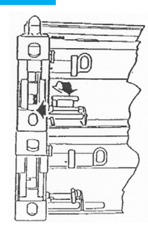


FIGURE 7

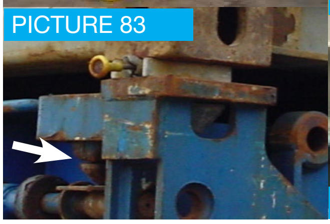



PICTURE 79


PICTURE 80


PICTURE 81


PICTURE 82


PICTURE 83


PICTURE 84


PICTURE 85

There is no reason why these units cannot be stacked and connected and then transported on road vehicles or rail wagons. However, unless the interconnection device is approved for lifting (i.e. a “lift lock”), the assembled stack should only be lifted using the bottom corner fittings on lowest unit within the stack.

Picture 79 shows a stack of four 20ft platform flats interconnected by manual twistlocks (**Picture 80**) which have a safe working load for lifting (SWLL) of 10 tonnes. Each platform flat has a tare of 4,850 lbs (2,200 kg). In the configuration shown, and where the stack is lifted from the top, the twistlocks between the top and second unit will have to support 6,600 kg or 1,650 kg each and have a safety factor of 6.

Since there is no means of keeping these (rated) twistlocks together with the flatracks, there is a probability that they could become separated and replaced by non-rated twistlocks. Therefore forming stacks of flatracks using loose twistlocks should be avoided.

Picture 81 shows the stack being moved using a fork lift truck, which is a suitable method of moving these stacks.

8.6 Unacceptable Interconnection Nesting Practices

Stacks of nested flatracks which are not formed using the correct and approved interconnectors increase the risk of failure:

- Poorly formed stacks can have edges protruding outside of the ISO envelope
- Missing or unconnected linking methods can result in the stack losing integrity and failing

Picture 82 shows a stack of 20ft folding end flatracks. There are two similar design units either side of a third (older) unit which has no top corner fitting, but will have a stacking aperture. The top two units are closely connected together while the connection between the middle and bottom flatrack is by means of two manual twistlocks. **Picture 83** shows a close up of the nearest corner and the flip-lock that should have been used to connect the units together can be clearly seen (arrowed).

There is a serious risk of failure for this stack of flatracks:

- Incorrect interconnectors
- Unknown strength of interconnectors
- Protruding release gear
- Irregular stack envelope

Picture 86 overleaf shows a stack of four 40ft folding end wall flatracks. At first glance the stack appears to be square and regular; however the connection on the right of the picture between the third down and the bottom units is highly irregular and shown in more detail in **Picture 84** and **Picture 85**. The reason for the use of the green strapping can be found in **Picture 85** where the end of the flip lock attachment bar (arrowed) can be clearly seen which would indicate that the flip lock is missing.

The missing flip lock from the bottom right hand corner fitting would render the stack unsafe to lift.

Under no circumstances should a fully automatic twist lock be used within a nested stack of flatracks. There is a serious risk of the release toggle (see **Picture 83**) becoming trapped when lifting resulting in the units below being released and falling.

8.7 Vertical Tandem Lifting (VTL)

VTL is described and defined within ICHCA International’s Technical / Operational Advice Note 1

PICTURE 86

(TA1). VTL operation is the process where two or three containers that are interlocked vertically together and lifted as a single unit.

Paragraph 8.1.2.5 of TA1 states:

"No folding end platform based container with its end frames erect should be lifted as part of a VTL unit. Folding end platform based containers with their end frames folded may be lifted in a VTL unit or, if they are designed to be so lifted, interlocked and lifted in a unit in accordance with ISO 3874, paragraph 6.4.4."

Paragraph 6.2.4 (Top Lift Spreaders) and 6.4.4 (Bottom Lift sling) of ISO 3874 states:

"Folding platform based containers (codes PL and PC; see ISO 6346), when empty and in the folded condition may be handled in interlocked piles. The total mass of the pile shall not exceed the maximum gross mass (rating) according to ISO 668."

Under ICHCA International advice TA1:

- A single folding end flatrack or platform flat may be included in a VTL unit and interconnected using approved liftlocks
- A stack of interlocked folded end flatracks can be lifted using a top lift spreader, but since the combined mass of four 40ft folding end flatracks is very nearly 20,000 kg it cannot be lifted in combination with other units

When lifting a nested stack of flatracks, consideration must be given to the safety of the operation. Nested stack should only be lifted by a top spreader if:

- All the interconnectors are an integral part of the flatrack and are connected to the flatrack by a solid bar and correctly anchored against longitudinal movement
- All the interconnectors are visible and in the closed/ engaged position
- All top plates show no sign of damage

If there is a concern that the nested stack is unsafe operators should consider alternative lifting methods.

The US Occupational Safety and Health Administration (OSHA) published amendments to its rules for terminal operations 29 CFR parts 1917 and 1918 concerning VTLs in general and part 1917.71 (i) 10 , stating:
"No platform container may be lifted as part of a VTL unit."

The OSHA rule was challenged by the National Maritime Safety Association (NMSA), and following that challenge OSHA issued instructions in April 2014 which removes that prohibition, and permits lifting of stacks of platforms and folded flatracks up to the full height of a standard container so long as interconnected using the built in devices.

Where other twistlocks are used (including semi-automatic twistlocks (SATLs) only two folded flatracks may be lifted.

9 | TRANSPORTING NESTED / MULTIPLE UNITS


PICTURE 87

9.1 Preparation

The nested stack of folding end flatracks has been designed to imitate a standard 8ft 6in high, 20ft or 40ft long ISO envelope. Therefore, when it is being transported it should present no additional risks to operators or the infrastructure.

Nested stacks of flatracks are formed to simplify and speed the process of positioning reasonable numbers of empty/unloaded units. However, to ensure that the stack is secure and safe to handle, pre-movement checks must be completed on each flatrack to be included into the stack:

- Flip-locks must be original or marked with a safe working load
- Flip-locks must be permanently attached to the flatrack using the original attachment devices and be easily rotated from their housings to the corner fittings and vice-versa
- Flip-locks must operate smoothly by hand and provide some resistance against twistlocks turning when the fittings are vibrated

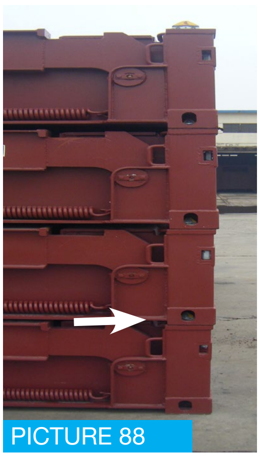
No flatrack container may be included into a stack where one or more flip-locks fails to comply with the requirements above.

Flatracks to be top lifted as a nested stack must not be interconnected by any other means of connection, except twistlocks approved and certified for lifting purposes, for example liftlocks. Prior to lifting, all corners of the nested stack should be inspected to ensure that all flip-locks are in place and engaged correctly.

Picture 87 shows a properly formed nested stack of 40ft folding flatracks loaded on a flatbed semi-trailer for movement to the terminal for empty positioning.

Picture 88 and **Picture 89** show a stack of four 40ft flatracks viewed from the side. It is just possible to see the highlighted yellow face of the flip lock in **Picture 88** (arrowed) indicating that they are not engaged. It is difficult to see the flip locks in **Picture 89** which indicates that they are engaged with the unit above.

Picture 90 and **Picture 91** show the same stack from the rear. In **Picture 91** the yellow face of the flip locks are visible (arrowed) and from this direction this indicates that they are in the engaged (locked) position and therefore safe for lifting.

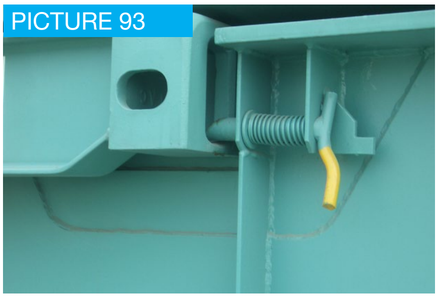

PICTURE 88

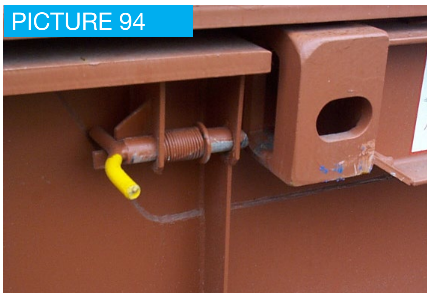

PICTURE 89


PICTURE 90


PICTURE 91

PICTURE 92


PICTURE 93


PICTURE 94

The nested stack should not be lifted if any twistlock is not properly engaged.

9.2 End Wall Securing

Flatrack containers with folding end walls are fitted with devices, known as head locks, which are designed to retain the end wall in the folded/flat condition.

Some flatracks are built with two such devices per end wall while others will have just one, often mounted on opposite sides.

It is important that prior to transporting especially by road or rail, that the end walls are checked to ensure that they are properly secured in the folded position.

Picture 92 and **Picture 93** show two of the various designs in use. Prior to moving, the head lock handles shown should be checked to ensure that they move freely and are properly engaged into the end wall corner fitting.

The most common reasons for the end wall not being properly retained are:

- End wall latch locks retained in their open position. Many head locks are fitted with a means of holding the lock open, so that it is possible to erect the end wall by one person using a fork lift truck. Once the end wall has been erected, the head locks should be released so that they are free to operate normally and not be held in the open position during normal operations. **Picture 94** shows the head lock in the open position and the highlighted handle can be seen to protrude beyond the top side rail as shown in **Picture 95**
- The end wall head locks are frozen due to poor maintenance. Corrosion or damage can and will prevent the header locks from operating correctly. Flatracks with one or more head locks that will not operate due to poor maintenance should not be placed on the top of a stack, especially when the stack is to be moved by road or rail
- Debris caught under the end wall preventing it from folding completely flush and thus preventing the head locks from engaging. **Picture 96** shows dunnage and a lashing chain in the end wall bottom rail recess that prevented the end wall from lying flush and the head locks engaging correctly

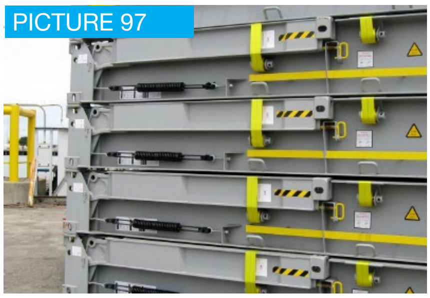
Failure to secure the end walls down correctly can result in the rear end wall being lifted by the flow of air over the deck of the flatrack as they are transported on road vehicles or rail wagons.

To provide additional safety, some operators and handlers require that the end walls are secured down using straps or webbing.

Picture 97 shows a stack of flatrack containers with a built in lashing system. Straps have been positioned so that the end pair can be used to secure the end walls in their folded position.


PICTURE 95


PICTURE 96


PICTURE 97

ABOUT THE AUTHOR

BILL BRASSINGTON

Bill Brassington is an experienced engineer who has been heavily involved with container development for many years, working both for shipping lines and container leasing companies as head of maintenance and technical services departments.

He now provides independent supply chain safety and security consultancy and, among other publications, is the author of the International Labour Organisation's report "Safety in the supply chain in relation to packing of containers". He also provided consultancy services to the Group of Experts on the revision to the IMO / ILO / UNECE Guidelines for packing cargo transport units (CTUs) and serves as Deputy Chairman of ICHCA Inrternational's ISP Technical Panel.

Bill is an active member of the international standards community covering freight containers and is the Chairman of the ISO Technical Committee Sub-committee on special purpose containers (TC 104/ SC2). He brings a wealth of experience to this sub-committee following many years of development work on reefers, palletwide containers, tanks and folding flatracks

Together with this current publication, Bill is also the author of ICHCA's 'Briefing Pamphlet #38: Safe Handling of General Purpose Freight Containers'.

ABOUT ICHCA INTERNATIONAL AND THE ISP TECHNICAL PANEL

Founded in 1952, the International Cargo Handling Coordination Association (ICHCA) is an independent, not-for-profit organisation dedicated to improving the safety, productivity and efficiency of cargo handling and goods movement by all modes and through all phases of national and international supply chains.

ICHCA International's privileged non-government organisation status enables it to represent its members, and the cargo handling industry at large, in front of national and international agencies and regulatory bodies.

ICHCA develops publications on a wide range of practical cargo handling issues, while its Technical Advisory Service provides members with recommendations on a wide range of cargo handling and transport issues, drawing on the experience and expertise of the ICHCA global member community and, in particular, that of the ISP Technical Panel.

Known for many years as the International Safety Panel, ICHCA's ISP Technical Panel represents a formidable body of expertise in cargo handling safety, legislation and operational best practice. Panel membership is strictly by invitation/approval, based on individual members' experience and expertise in their specific field.

Today, the Panel is made up of over 70 practitioners and consultants from more than 20 countries, representing shipping, ports, terminals and land transport; government and enforcement agencies; labour; container design and operations; cargo handling equipment and systems; insurance interests; and other key parts of the cargo handling chain.

This broad cross-section of interests and expertise allows the Panel to evaluate operational and regulatory issues from many angles, and ensures that the viewpoints of many different parties are represented.

The ISP Technical Panel plays a core role within ICHCA International, providing advice and assistance to members; developing ICHCA's extensive range of technical documents and research papers such as this one; and assisting with ICHCA's work on international legislation. The Panel has convened over 70 times since 1991 in more than 25 locations worldwide.

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