



TWISTLOCK
africa

Jun 2023

Product Catalogue



THIS CATALOGUE INCLUDES:

- Shipping container twistlock information
- Shipping container component and accessories information
- Shipping container technical information (coming soon)

Your container connection connection!

100 8th Avenue Edenvale, Gauteng

7 Simone Street De Tijger Parow, Western Cape

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Introduction

Twistlock Africa was founded in 2015. Its core business is to import and distribute shipping container twistlocks and spares to the African market. The company has evolved and expanded its offering significantly in terms of the number of products as well as being able to offer its clients bespoke engineered solutions where standard products are not able to solve the challenges being faced.

Twistlock Africa is more than just a reseller of components, it prides itself on being a SME (Subject Matter Expert) in the application and implementation of shipping container specific products to solve challenges that users face.

The founders and Directors of Twistlock Africa have a wealth of knowledge and experience in various industries from mining to maritime with combined experience exceeding 40 years.

We are more than just your average supplier of container twistlocks and spares. We pride ourselves on our knowledge and expertise on containers and container related products to provide our clients with cost effective, efficient, and bespoke solutions.

With this catalogue, we hope to share some of our knowledge to anyone interested and considering the use of shipping container and modules to solve challenges that they have.

Mission Statement

At Twistlock Africa, we are passionate about the promotion of the interlocking concept of intermodal design and the philosophy that can be applied to solve challenges experienced in various industries. We do this by applying systems and components readily available in the shipping container industry as well as bespoke engineered solutions where existing systems and components cannot solve a clients challenges, we work with our clients to solve challenges they face, providing solutions that are cost effective and fit for purpose.

Disclaimer

The information presented in this document is correct at the time that it was released and can change without notice in subsequent revisions and periodic updates. It is recommended that clients check in regularly to ensure that they have the latest revision of this document.

Information shown should not be used for detailed design, certified information can be requested from Twistlock Africa which will ensure that clients have the latest information.

Product images and drawings used in this document are typical, final products delivered may vary slightly depending on the units available at the time of order. Exact models can be requested and ordered which may result in lead times of up to 8 weeks, or more.

SUBJECT TO ERRORS OF TYPESETTING, MISPRINTS AND MODIFICATIONS, ILLUSTRATIONS ARE GENERIC AND FOR REFERENCE ONLY

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Meet the team:

Johannesburg

Ralph Siebenhaar - Solution Specialist



A degreed and practicing mechanical engineer with 20 years experience in the mining industry executing mega projects around the globe for various commodities.

He brings with him a wealth of practical experience to assist clients using shipping containers and applying the intermodal philosophy in unique ways.

He has a passion for modular plants, promoting the many benefits that the approach offers for various applications, specifically for projects in Africa where abnormal loads aren't always possible and time on site needs to be kept to a minimum.



Thiani van der Merwe—Technical Sales Specialist



Thiani brings with her almost a decade of experience in the container conversions and parts industry. She has a proven record of being the go-to person to solve technical challenges in the modularization space and working in Africa. She is known for her ability to provide bespoke, innovative and practical solutions to clients who recognize her commitment to deliver great solutions, quality products and world class customer service which is possible with the support of a network of trustworthy specialists and suppliers that she has built up over the years.



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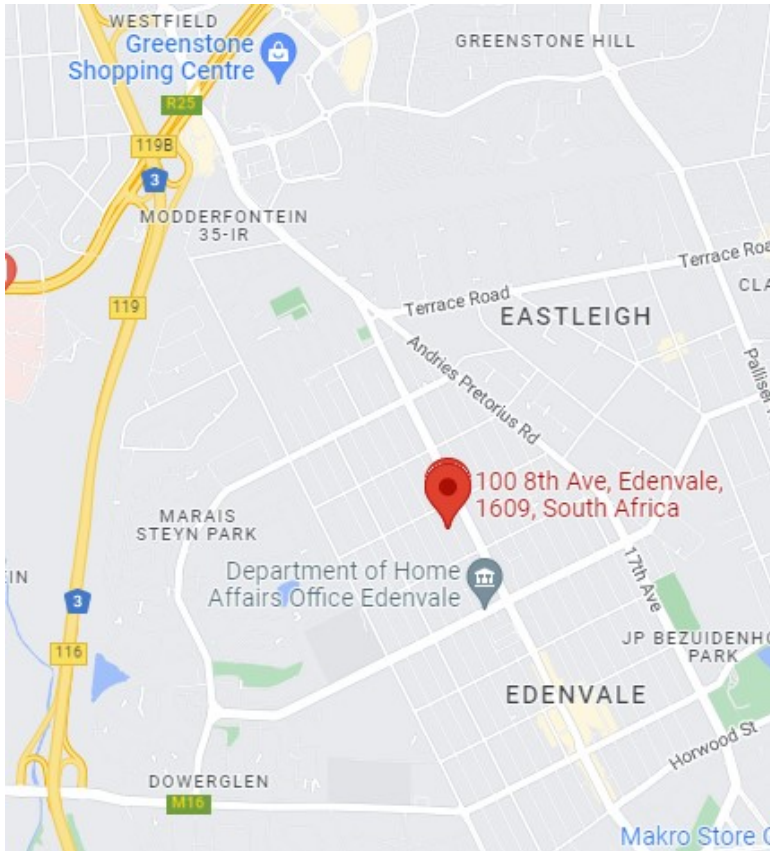


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Branch Locations:



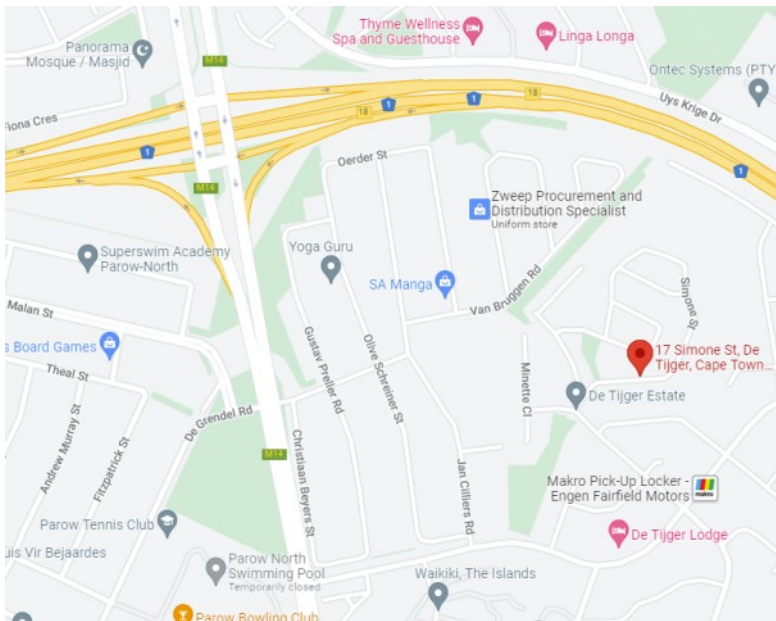
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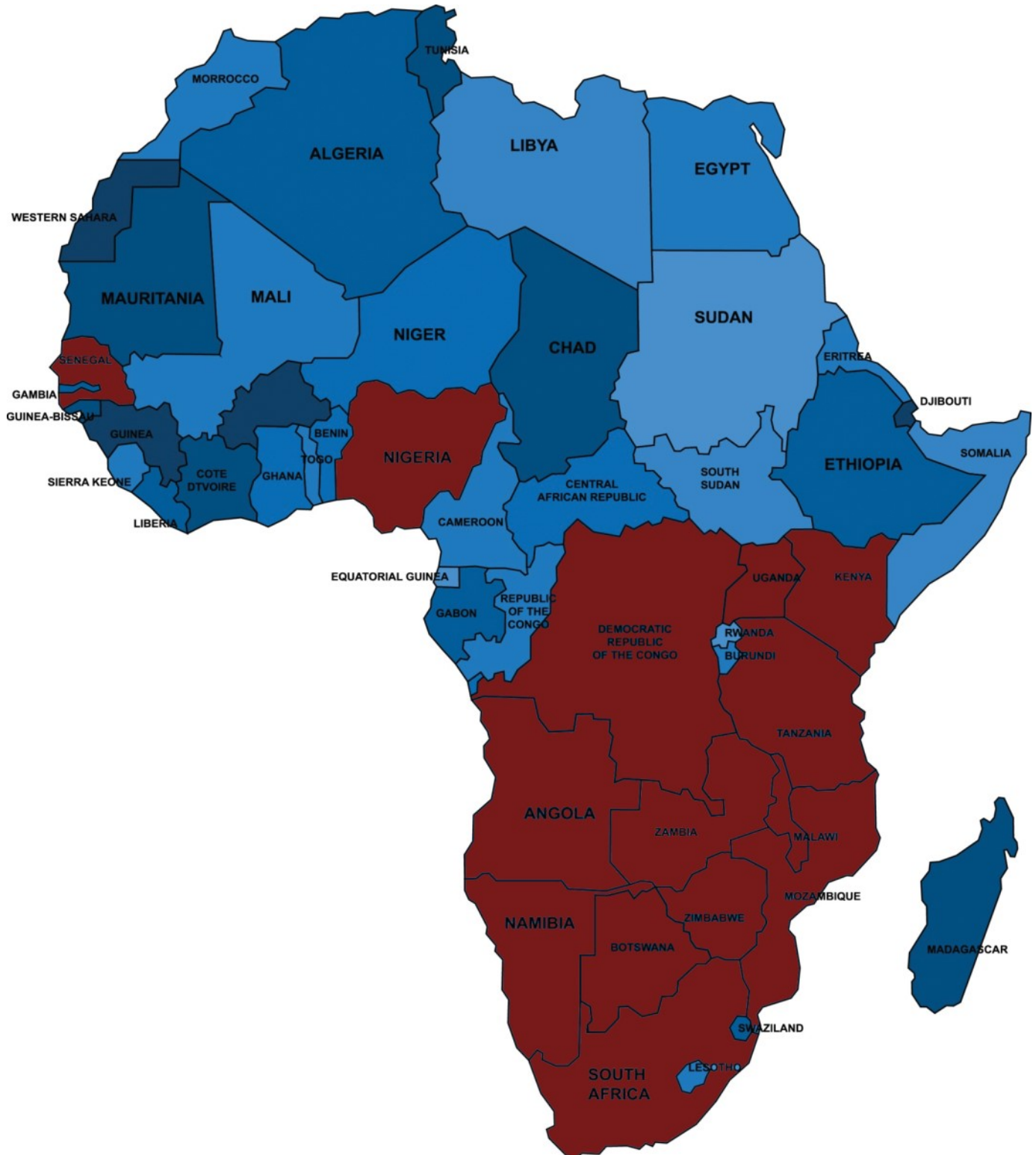




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Countries where we have satisfied clients:



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Some of our clients:



**Mineral
Technologies**
A Downer Company



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Container Projects

The pages that follow are the major projects that Twistlock Africa has had a significant involvement in, not only the supply of various components but also advising clients on the application of the intermodal philosophy to simplify erection as well as significantly reduce the erection time when the modules and components arrive at their intended destination.

For further information, hyperlinks have been included for each project.

This section of this document shall be periodically updated to highlight future projects that Twistlock Africa is involved in.

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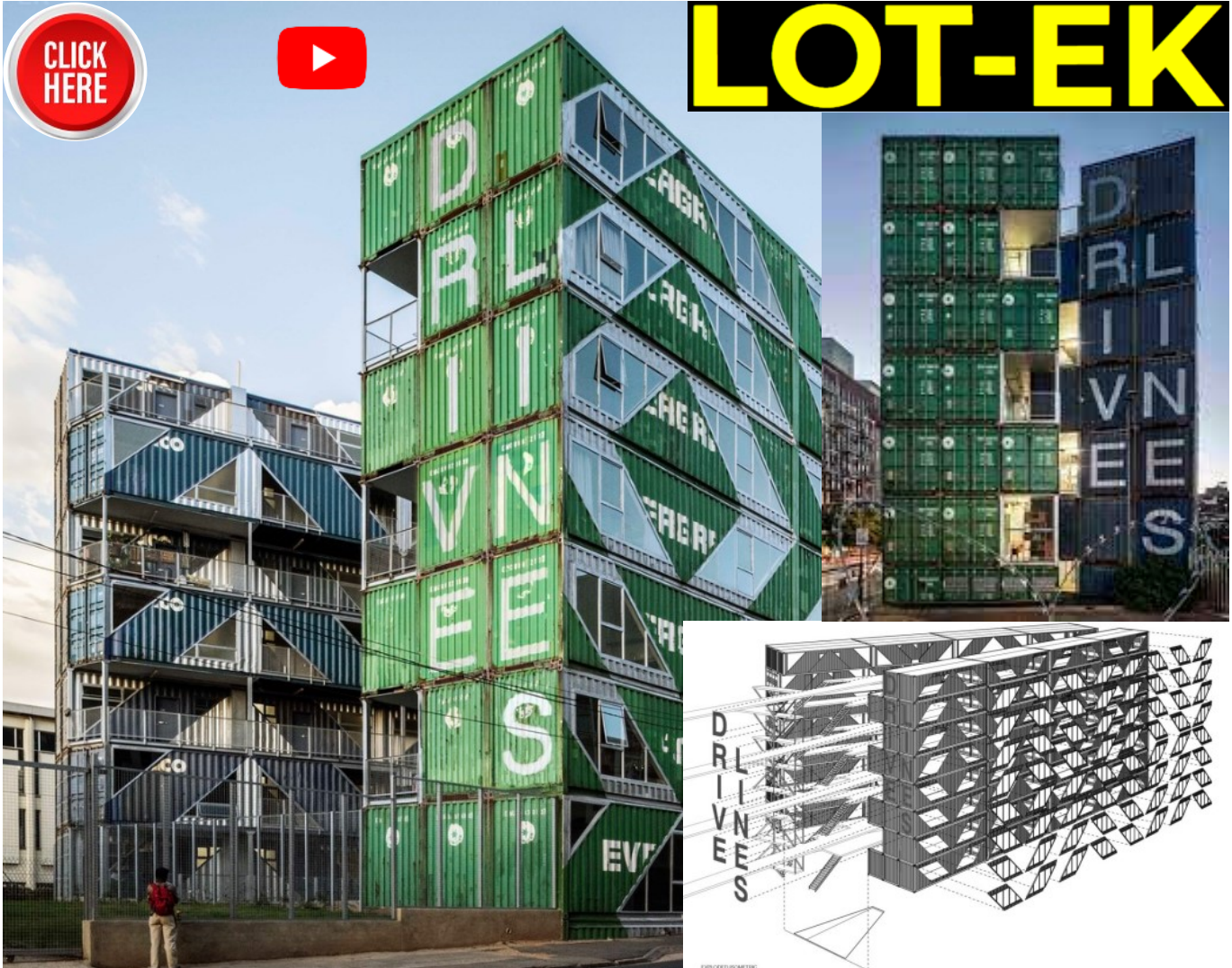
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Drivelines Project—Mabuneng (Johannesburg)



The DrivesLines project was designed in America (www.LOT-EK.com) and built in Mabuneng, Johannesburg. A multistorey containerized building showcasing an example of the upcycling of shipping containers for low cost housing.

Twistlock Africa assisted LOTEK with the design and integration of twistlocks to facilitate the quick and safe erection of the structure during construction.

Products supplied by Twistlock Africa:

- Semi-Automatic Twistlocks for locking the containers together
- Dovetails for the connection of the containers to the foundation
- Corner castings for the foundations and additional structures.

This was a once off project used to show case the possibilities of using shipping containers for other than the transport and storage of goods.

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Reflux Classifier Fines Recovery Modular Plant



The modular plant consists of a number of 6m container sized modules that are rigidly connected together to create a solid foundation and structure. Different modules were developed to incorporate the various process equipment to create the recovery flow sheet. Modules included: MCC, control room, tanks and pumps, cyclones, screens, chutes and reflux classifiers together with mobile conveyors to stockpile the recovered material and tailings away from the plant. The modular approach has various benefits:

- Ability to relocate with minimal staff and lifting equipment
- Pre-commissioning in a controlled environment
- Ease of transport to installation site using flatbed or standard container trucks
- Expandable

Twistlock Africa supplied the following equipment to the project:

- Corner castings used in the fabrication of each module
- Double ended manual twistlocks to align and secure the modules vertically
- Bridge clamps to pull the modules together horizontally

This modular plant is now a standard offering by FLSmidth which is continuously evolving to meet various client requirements as the approach is being adopted around the world.

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Flotation Modular Plant



ProProcess
Innovate Design Fabricate



The modular plant consists of a number of 12m container sized modules that are rigidly connected together to create a solid foundation and structure. The modular approach has various benefits:

- Ability to relocate with minimal staff and lifting equipment
- Pre-commissioning in a controlled environment
- Ease of transport to installation site using flatbed or standard container trucks
- Expandable

Twistlock Africa supplied the following equipment to the project:

- Corner castings used in the fabrication of each module
- Double ended manual twistlocks to align and secure the modules vertically
- Bridge clamps to pull the modules together
- Custom made internal bridge fitting

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Maintenance skid—Dry Mining Unit



The mobile skid is used to support the Dry Mining Unit (DMU) (www.adpgroup.com/) by providing a secure working area to maintain equipment and store consumables and spares. The skid is dragged across the sand with bulldozers. The skid consists of 2 x 6m containers, one for ablutions (www.telenetix.co.za) and tool room and the second for the storage of spares. Together with the ablution container, a quarter height container houses the raw water and waste water conservancy tanks.

Twistlock Africa supplied the following equipment to the project via the SMPP contractor:

- Double ended manual twistlocks to align and secure the modules vertically
- Dovetail twistlocks to secure the containers to the skid
- Bolttable twistlocks to secure the roof to the containers

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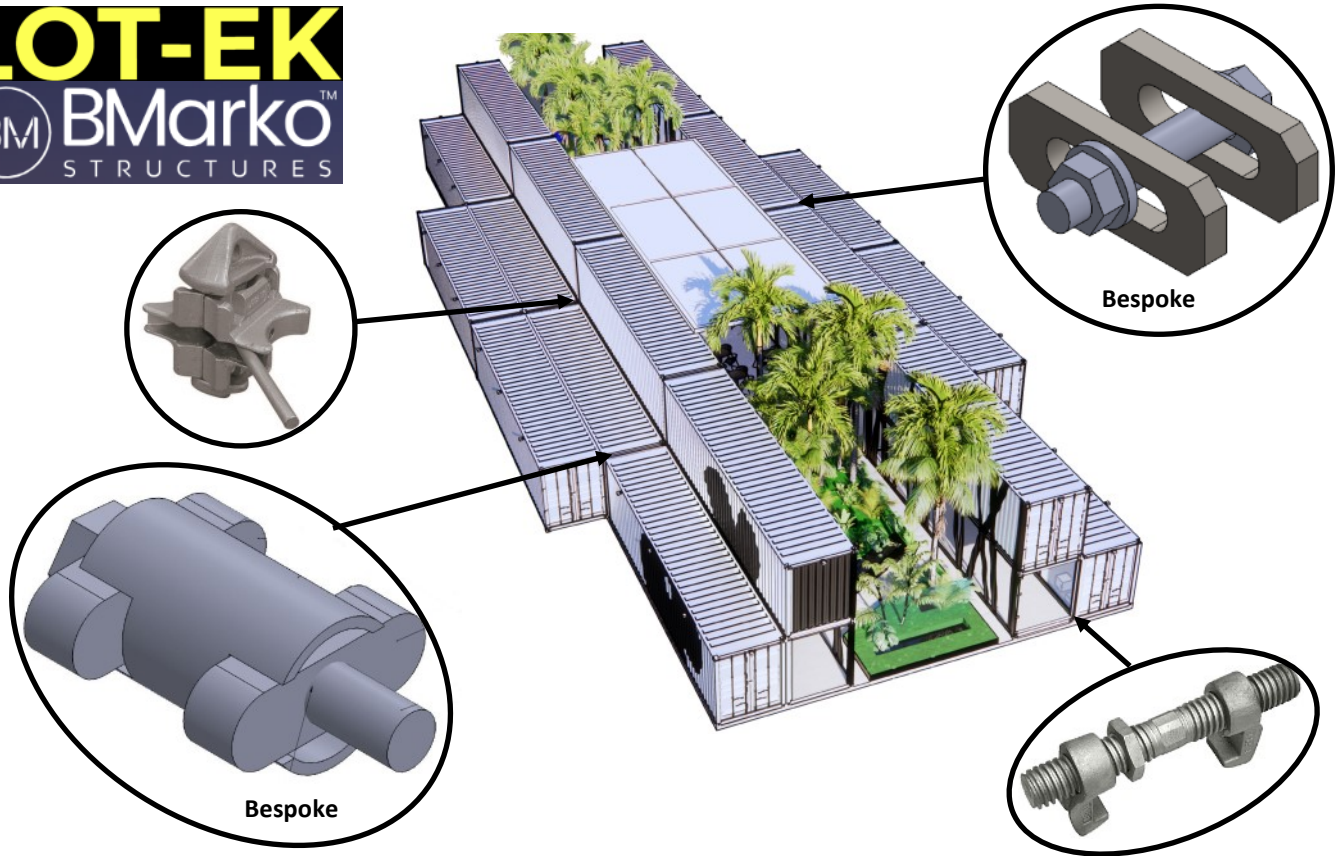
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BAL HARBOUR SHOPS—Miami Florida, USA



The Bal Harbour Project is a first of a kind, where shipping containers have been used in an up market shopping district as a form of expansion.

Bal Harbour is known as a tranquil and luxurious enclave at the northern tip of Miami Beach, Bal Harbour is famous for the upscale Bal Harbour Shops and lavish oceanfront resorts with white sand beaches. It's also home to several beloved fine dining restaurants.

This project, designed by LOTEK, was fabricated and constructed by BMarko. Twistlock Africa was asked to design and supply the connections between the shipping container modules, in some locations, bespoke units were designed to solve challenges brought on by access constraints.

As far as possible, the connectors were to be hidden, which was achieved through the use of bespoke connectors, designed in Solidworks and 3D printed in South Africa as proof of concept, before being fabricated and installed within the structure.

Twistlock Africa was also tasked with determining and proposing the assembly sequence taking into account accessibility challenges brought on by structures that were added to the structures to facilitate access to the higher levels.

This project highlighted Twistlock Africa's capabilities to work with clients, to understand their challenges, design bespoke solutions and source products around the world.

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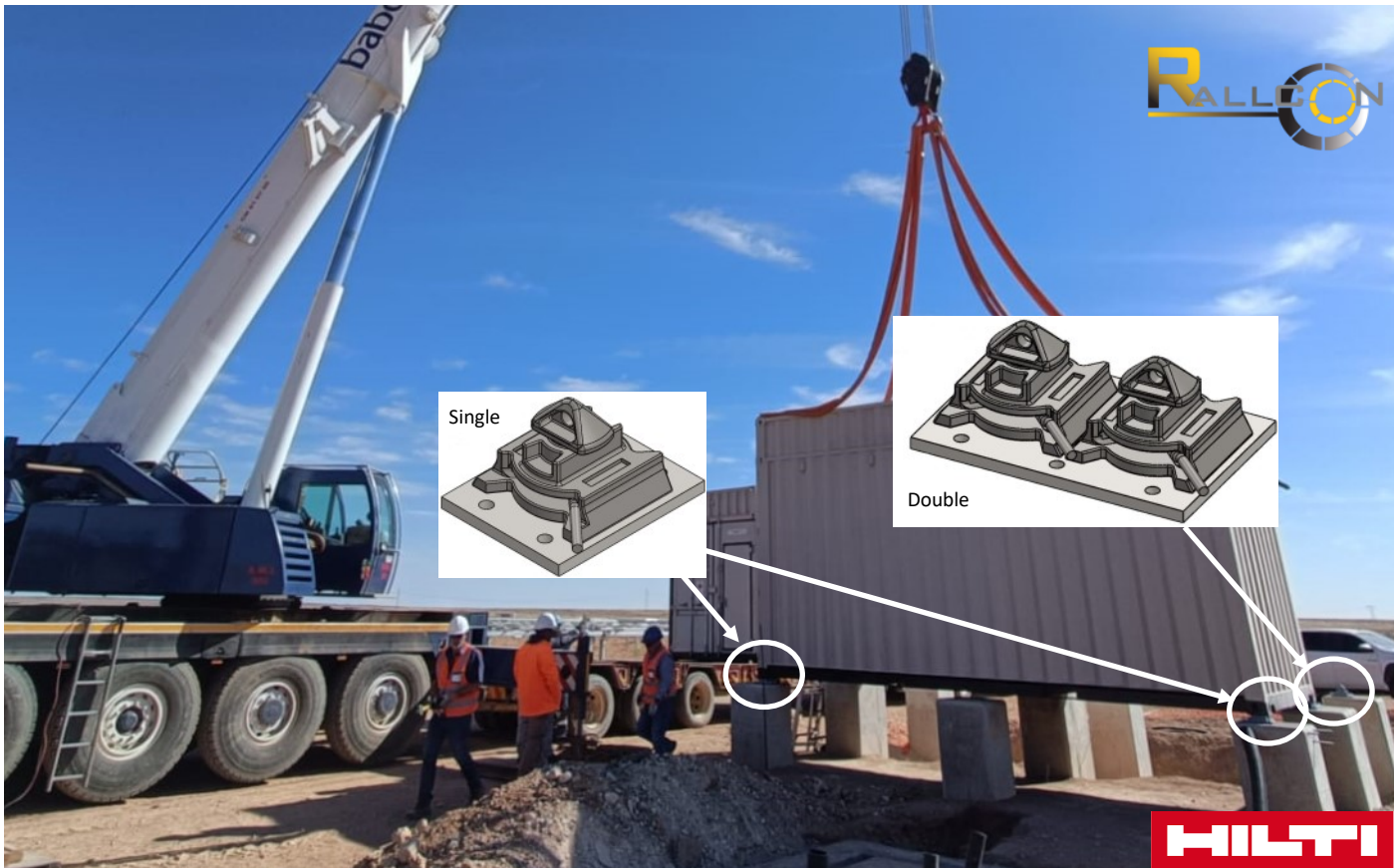


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BESS Solar Project—Northern Cape, South Africa



With a growing industry of solar farms in South Africa, there is a drive for efficient installation of the containerised substations and battery storage units. The solution that has been proposed and implemented is to use standard bolttable twistlocks. Single twistlocks on the corners and double twistlocks where 2 containers meet. Using HILTI anchors and epoxy, the foundations are easy to install and create a strong foundation for the containers. The landing pads on the twistlocks can be levelled by a surveyor before the containers arrive on site.

The benefit of this approach is that it creates an efficient method to guide and secure the containers to the concrete foundations as well as reduces the time the crane is required to offload the container from the truck and land it on the foundations.

Once landed, the twistlocks are locked using the handles, thereby creating a positive engagement between the foundations and the containers. The twistlocks can be used for the bonding of the containers to the foundations.

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Engineered Solutions

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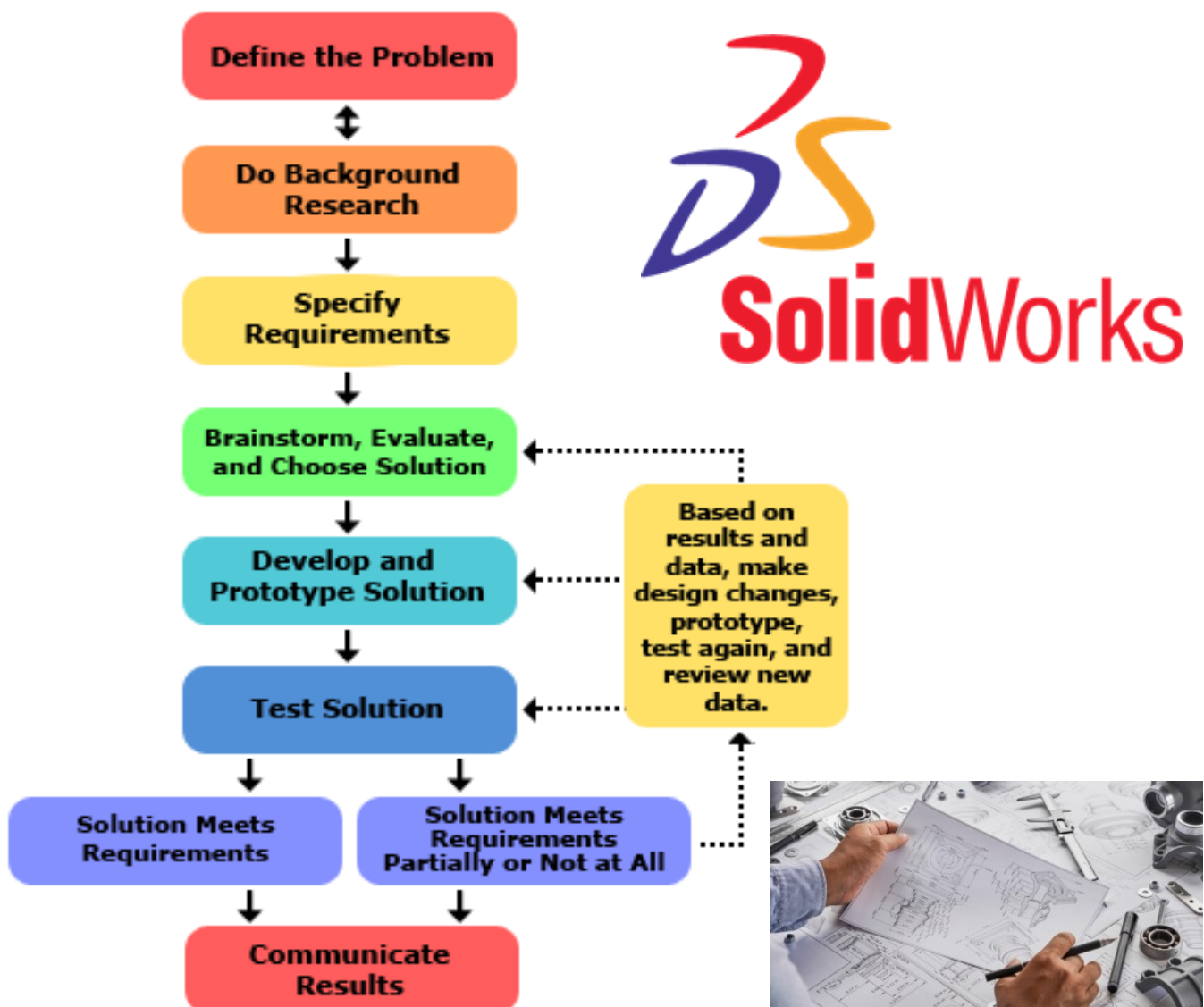
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At Twistlock Africa, we understand that each client has unique challenges when working with containers and employing the intermodal philosophy. In the majority of cases, standard units can be applied, however, in some instances, bespoke solutions are required. Twistlock Africa has the unique tools, resources and ability to develop products from first principles following a logical design and engineering flow. This approach ensures that the final solution meets the specific requirements of the client, can be manufactured, is practical, robust and cost effective.

Twistlock Africa has at its disposal powerful 3D modelling software (Solidworks) and 3D printers to develop solutions in 3D and to physically produce prototypes for testing and proof of concept. Once approved, Twistlock Africa's network of vetted fabricators and suppliers to fabricate and deliver the final solution.

Once successfully implemented, some of the developed solutions become a standard offering. The understanding is that often challenges encountered by a client may often be experienced by other clients.



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Partnerships

Twistlock Africa has partnered with some major brands to make its amazing products even better as well as to able offer its clients access to a vast array of world renowned brands and products.



ASSA ABLOY

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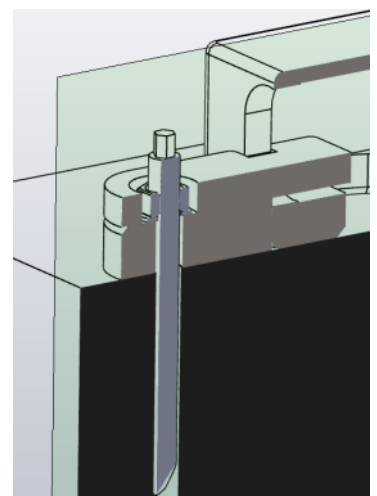
Partnerships



Container internal modular racking systems for the installation inside containers to attach shelves and cable trays, amongst other things.



Container anchor and foundation systems and solutions.



Amongst many others

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Partnerships



This partnership gives Twistlock Africa access to a vast array of world class brands and products, including:

- Valves
- Structural steel
- Piping of various grades
- Tooling
- Solar accessories
- Complete containerized solutions
- and many more...

Click on the TPEA logo for more information.



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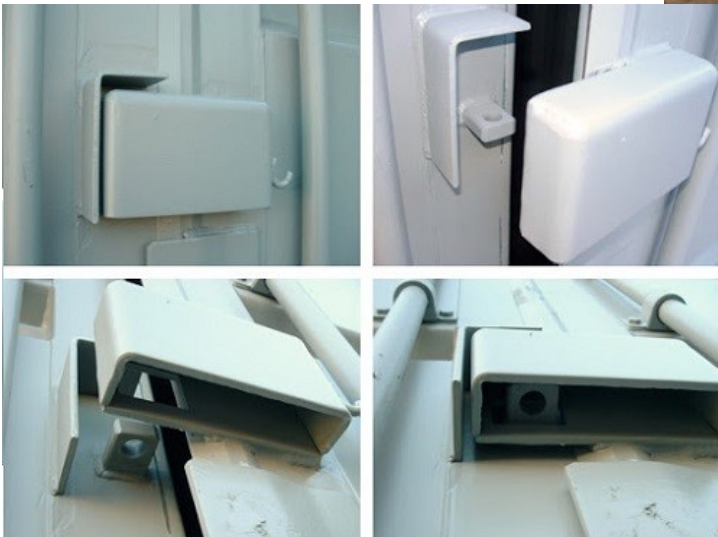
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Partnerships

ASSA ABLOY

The partnership with Assa Abloy allows Twistlock Africa to offer its clients world class top security features as part of its offering, from fully digital solutions to best in kind mechanical locks.



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Product Categories

Page

A	Standard Twistlocks	24
B	Stacking Cones	31
C	Tailer Components	34
D	Security Solutions	38
E	Container Parts	42
F	Accessories	45
G	Lifting Equipment	48
H	In development	50

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Technical Information

Page

I

Twistlocks (coming soon)

J

Stacking Cones (coming soon)

K

Tailer Components (coming soon)

L

Security Solutions (coming soon)

M

Container Parts (coming soon)

N

Accessories (coming soon)

O

Lifting Equipment (coming soon)

P

Container Set outs

115

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Technical Information

Page

Q	Container ISO Standards	118
R	Engineering Information	20
S	Types of Containers	141
T	Additional Information (Coming Soon)	
U	Notes	149

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Products

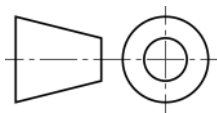
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A - Standard Twistlocks



Drawing available.



3D model available

Format: STEP, PRT and ASM

Drawings, data sheets and 3D models are available on request—please email info@twistlockafrica.co.za with your requests.

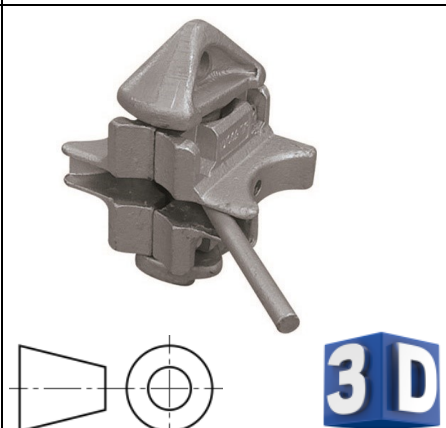
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A - Twistlocks

No.	Product	Description	Image
1	Double Ended Manual Twistlock	The double ended manual twistlock is the original connector used in the shipping container industry. Although not often used on container ships nowadays due to accessibility issues on larger stacks, they still have their place on bulk carriers and other applications. Variations have been developed over the years, but the fundamental principle has stayed the same. The operation is simple, with the movement of the lever from one side to the other to either lock or unlock the unit. These can be used where ever corner castings are present.	
2	Semi-Automatic Twistlock	This unit is the next evolution of the manual double ended twistlock in that is able to automatically engage when a container is loaded onto another container. To remove the container, the toggle on the twistlock is pulled and locked. Pulling the toggle locks the twistlock in the OPEN position. The toggle in the locked position is a visual indicator forming the crane operators that the container can be lifted. Primarily used on container ships to facilitate faster loading and unloading of containers, these twistlocks can be used to facilitate the safe stacking of containers on shore as well, examples include container billboards and container buildings. A number of variations are available on the market, all of which function in the same way. Double toggle semi-automatic twistlocks are the newest type twistlock used on container ships.	

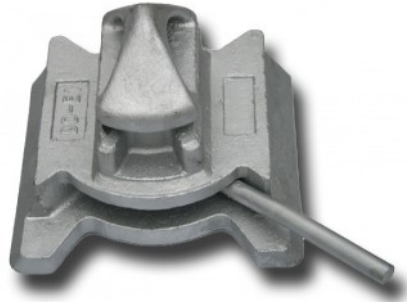
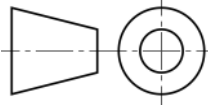
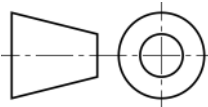
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No.	Product	Description	Image
3	Dovetail / Weldable Twistlock	This unit offers the flexibility to secure shipping containers to structures as well as structures to shipping containers. Originally developed for the shipping industry to secure containers to the deck of ships when used in combination with a dovetail slipper. This configuration allows the removal of the twistlock when not required. This twistlock is commonly known as a dovetail twistlock due to the shape and the interface with a slipper. These are also known as weldable twistlock as it offers the opportunity to be welded to steel surfaces. It functions the same as other twistlocks in that the lever is moved once the shipping container has been landed onto the twistlock. The turning of the handle creates a positive engagement with the corner casting securing the container to the structure or the structure to the container. These are available in either left handed or right handed options. Left handed being the most common. There are a number of variations available in the market, with different configurations.	  
4	Boltable Twistlock	This twistlock is a variation of the standard dovetail / weldable twistlock. With the addition of a base plate, it offers the opportunity to bolt the twistlock to structures using fasteners as well as to concrete foundations using chemical anchors or RAWL bolts. This twistlock can be removed when not required. When used as a foundation, shims can be used to achieve the correct elevation, then grouted. The baseplate of 200mm x 200mm is the standard design. Hole positions and plate size can be customized to meet a clients specific requirements. Various footprints available.	   

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A - Twistlocks

No.	Product	Description	Image
5	Horizontal Twist-lock	This twistlocks primary function is to connect 2 <u>empty</u> 6m (20ft) containers together to allow them to be handled as a 12m container during loading onto container trucks and ships. Only 2 twistlocks are required for this arrangement. The connection between the 2 containers can be end to end or side to side. The side to side connection can be used to lock the containers together to create a rigid structure. For a side to side arrangement, 4 (one on each corner) of these twistlocks are recommended. Alternative uses include the attachment of structures to the side of the top corner castings. Structures include walk ways, roofs, stair cases, masts, etc. There are a number of variations available, which includes a flange, a lifting eye or an anchoring point for cable stays. These take advantage of the oval opening on the side of the corner castings.	 

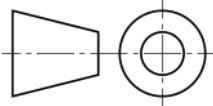
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A - Twistlocks

No.	Product	Description	Image
6	Bridge Clamp	A bridge clamp is used to tighten/lock the top corner castings of containers together of adjacent containers. They can be used for a width 203-258mm and tightened by turning the nut in the middle and then engaging the lock-nut to ensure that the fitting does not come loose. Shipping container bridge clamps are used in combination with shipping container twistlocks to create a container wall, locked together both vertically and horizontally. Bridge clamps and twistlocks make use of the container corner casting connecting shipping containers. <u>It should be noted that bridge clamps should not be used vertically as there is no positive engagement between the hooks and the corner castings.</u> A special vertical bridge clamp is under development and clients will be notified once this unit is available.	   

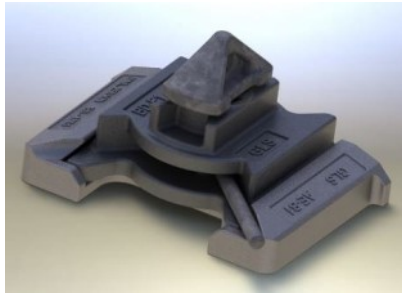
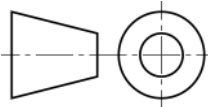
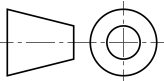
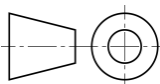
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No.	Product	Description	Image
7	Dovetail Slipper— Single	The dovetail slipper is used with a matching dovetail twistlock and once fitted, they provide a removable twistlock for fixing containers in position when required. Available in 45° and 55° variants. This slipper is welded into position. It should be noted that slippers should be installed in opposite directions to prevent the container from sliding out of the slippers in bad weather or if there is a likelihood of the foundation not remaining level. The application is not limited to that of that of the deck of a ship, but anywhere a container is to repeatedly mounted temporarily. For example a control room. The benefit of a slipper versus a boltable twistlock (Section A) is that the dovetail can be removed when not required, thereby removing a tripping hazard and the potential to lose fasteners in the case of a boltable twistlock having to be removed when not in use. Once installed, it should not be removed and reinstalled elsewhere.	   
8	Dovetail Slipper— Double	The dovetail slipper is used with a matching dovetail twistlock and once fitted they provide a removable twistlock for fixing containers in position when required. Available in 45° and 55° variants. This slipper is welded into position. A double slipper is used when 2 containers are required to be mounted adjacent to each other.	   
9	Anchor Twistlock (imported)	Anchor Twistlocks are useful devices that are used to anchor a shipping container to a concrete foundation. Anchoring of the shipping container serves the purpose of preventing theft through upliftment as well as keeping a shipping container anchored in extreme wind conditions. It is recommended that, as a minimum that opposite corners be anchored, however for maximum security, all four corners of the shipping container be anchored. The twistlock is secured to the concrete with either a chemical anchor or mechanical (RAWL bolt) anchor. The through hole allows for some adjustment once the anchor has been installed.	  

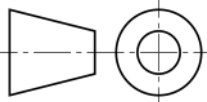
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A - Twistlocks

No.	Product	Description	Image
10	Anchor Twistlock (Local)	Developed by Twistlock Africa, this anchor twistlock serves multiple purposes. Primarily the anchoring of a containers after they have been landed onto a concrete foundation, and secondly, a mechanism that prevents the upliftment of containers in remote locations. This twistlock has been developed using a combination of materials that hinder the removal of the twistlock once installed. The design facilitates the installed of the anchor bolt after the twistlock has been installed. This twistlock has been designed to work with HILTI chemical anchors. Bought as a kit, clients benefit from significantly reduced pricing per anchoring point. Available is sets of 2 or 4.	  

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B - Stacking Cones



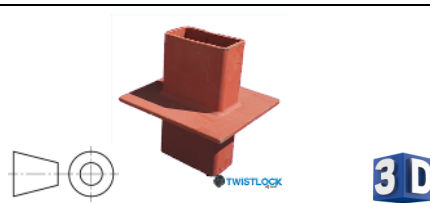
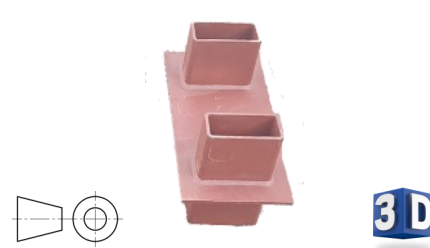
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B - Stacking Cones—South African

No.	Product	Description	Image
1	Single	This is a locally (South Africa) designed and fabricated stacking cone. A stacking cone is an alternative to double ended manual twistlocks and are used in the temporary stacking of shipping containers. Available in a variety of lengths and plate sizes.	
2	Double—Side x side	This side x side stacking cone is used to secure two containers that are located side by side, with a standard pitch of 258mm between the tube centres, which allows for gap between the containers of 79mm. Also available as a “tight-fit “ variant which has the containers flush with each other. Pitch is 180mm.	
3	Double—Transverse	This transverse stacking cone is used to secure two containers that are located end to end, with a standard pitch of 279mm between the tube centres, which allows for gap between the containers of 76mm. Also available as a “tight-fit “ variant which has the con-	
4	Quad	This quad stacking cone is used to secure four containers that are arranged in a 2 x 2. Available as a “tight-fit” variant , allowing the containers to be flush with each other once the quad can has been installed.	

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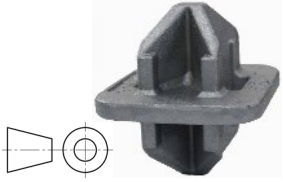
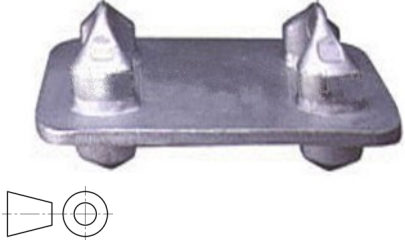
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B - Stacking Cones—Imported

No.	Product	Description	Image
1	Single	This is a standard imported single stacking cone, used in the temporary stacking of shipping containers.	
2	Double—Side x side	This is a standard imported double (side x side) stacking cone, only available with a 258mm pitch between centres.	
3	Double—Transverse	This is a standard imported double (transverse) stacking cone, only available with a 279mm pitch between centres.	

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C — Trailer Components



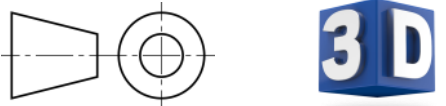
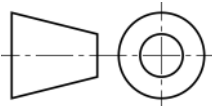
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C - Trailer Components

No.	Product	Description	Image
1	Standard	This twistlock is the industry standard unit that is widely used in the trucking industry in Africa. It offers the additional functionality of being able to retract the core into the body such that twistlock does not protrude through the deck of the trailer should the trailer be used for other purposes. The added benefit with this unit is that the core can be replaced should it be damaged without needing remove or modify the body of the twistlock. This unit come standard with a long handle, which can be tailored to suit a clients specific requirements. The installation requires a penetration be cut into the deck of the trailer and the top plate welded into position. Alternatively, these twistlocks can be used to secure structures to the top of shipping containers. The twistlocks can be welded directly to the structure, which can be lowered onto the container, the twistlocks penetrate the corner castings and the handle turned to engage the twistlock with the corner casting.	 
2	Heavy Duty	This twistlock has been specifically designed for the African market. It features heavier gauge graded steel while offering the same functionality as the standard trailer twistlock. This unit has also been used in the railway industry to secure shipping containers to rolling stock.	 

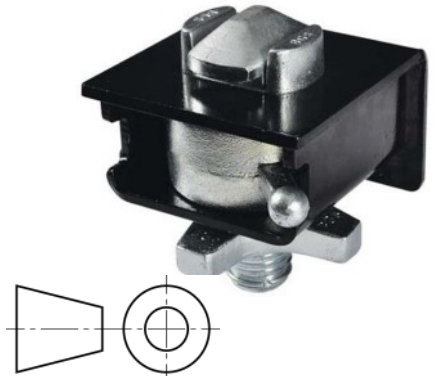
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C - Trailer Components

No.	Product	Description	Image
3	Heavy Duty Screw Down Trailer Twistlock	This twistlock is a variation of the heavy duty trailer twistlock with the added functionality of being able to pull the shipping container into the deck of the trailer.	
4	European Trailer Twistlock	This specific trailer lock is a heavy duty lock with the functionality to pull the shipping container into the deck of the trailer with additional safety features to comply with European requirements to ensure that the twistlock cannot come loose.	
5	Trailer Cargo Strap tie down	This winch can be used on a flatbed truck or a trailer. It can accommodate winch straps up to 100mm wide. The winch has a working load limit of 2500 kg's and a break strength of 5000 kg's. Usually installed on the drivers side and used together with 100mm nylon strapping (sold separately).	

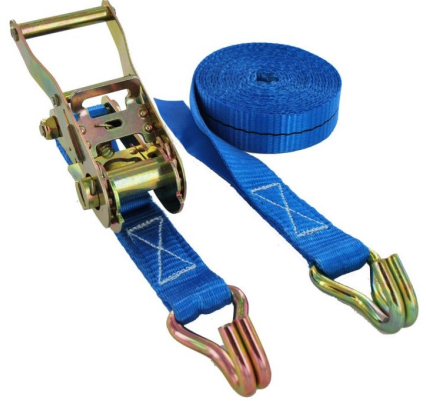
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C - Trailer Components

No.	Product	Description	Image
6	Tie-down ratchet straps	Heavy duty tie downs application on flatbed trucks and trailers. Available in various sizes. Extra long wide steel ratchet handle makes easy for tightening the strapping. Heavy duty industrial grade polyester webbing. Heavy duty double wire J hooks are able to fit onto various anchor points. Main strap can be used in conjunction with the cargo strap tie-down (item 5). Available in various widths/ load capabilities.	

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D — Container Security Solutions



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D - Container Security Solutions

No.	Product	Description	Image
1	Container door lock box	- Permanent solution (welded to container doors). - Designed to be used with special padlock. - Fabricated from gauged graded steel tube and plate to reduce the amount of welding required. - Heavy duty design with shielded internals to prevent access to the padlock lug. - Can be used in conjunction with other security solutions. - For maximum security, a minimum of 2 lockboxes are recommended. One at the top of the container door and the second at the bottom of the door.	
2	Container door lock box Padlock (Insurance)	Specialized padlock specifically designed to be used with a shipping container lockbox (item 1). The pin and key are located on the same side of the padlock. Available in different security grades and number of keys. - Can be ordered as keyed alike.	
3	Container door lock rod isolator	- Industry standard to secure liner owned shipping containers during transit. - Removable and reusable once container reaches destination and handed over. - Once installed and container has been loaded onto a truck, access, without steps or ladder, is difficult. - Quench hardened steel assembly which significantly improves the locks resistance to cutting and bending. - Adjustable for various container configurations. - Removable and replaceable UNION lock (available as keyed alike). - Available for truck bodies using lock rods (thinner material and reduced clamping pitch). - Manufactured in South Africa. - Can be used for containers used for on-site storage.	 

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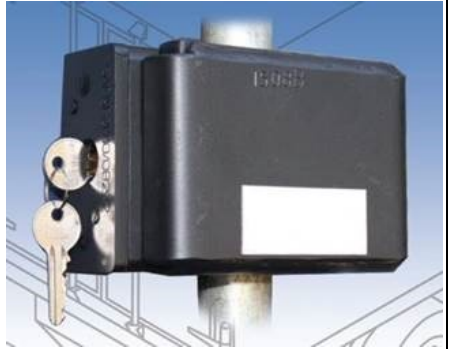
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D - Container Security Solutions

No.	Product	Description	Image
4	Container door lock rod handle isolator	- Patented internal locking and casing design. - 1000's already sold into Africa. - Removable. - Armor plated construction. - Manufactured in South Africa. - Can be used on shipping containers and vehicles. - Installation does not require modifications to the container or vehicle - Proven long lasting design in the harshest African conditions, moisture, heat and corrosive environments. - Various options and configurations available. - Standard locking mechanism brand: Viro (available as keyed alike). - Available locking mechanism brand and technology: Assa Abloy Mechanical and Cliq which offer world class access control and tracking. Can be used in conjunction with other security solutions. Available as keyed alike and digital key.	 
5	Container door lock rod handle isolator with cross bar	This unit is a variation of the standard container door lock rod handle isolator with the additional security for your container by connecting the lock rods on the two doors together. The clevis on the opposite door functions as a mounting and pivot point when the lock is opened and can be swung out of the way to open the container. The round bar is solid steel which will prove to be challenging to remove the lock from the container. The bar is fitted with pins, once installed to prevent removal of the lock.	 

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D - Container Security Solutions

No.	Product	Description	Image
6	Container bullet seals	Container seals, named also as barrier seals, are specially designed for applications such as security sealing shipping containers and box trailers. This security seals meet the security standard ISO 17712 barrier security seals and they are classified as High Security Seals.	
7	Container door lock rod clutch box	- Hardened case to protect the integrated lock - Removable design. - Manufactured in South Africa. - Lock brand: Union or Viro (available as keyed alike). - Can be used in conjunction with other security solutions.	
8	Container corner security anchor twistlock	This is a variation of the South African version of the anchor twistlock, with a further emphasis on security. This is achieved by introducing a pocket that protects the chemical anchor bolt's nut from being loosened once the chemical anchor has been installed. Once the bolt has been torqued, the pocket can be filled with epoxy, permanently securing the container to the foundation. This twistlock is designed to secure a shipping container to a concrete foundation. For maximum security, a twistlock is recommended for each corner of the container.	
9	Container door lock rod isolator Plus	This is an evolution on the classic lock rod isolator (item 3), which offers additional flexibility where the distance between the container door lock rods differs from container to container, or even on vehicles using lock rods.	

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E - Container Parts



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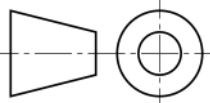
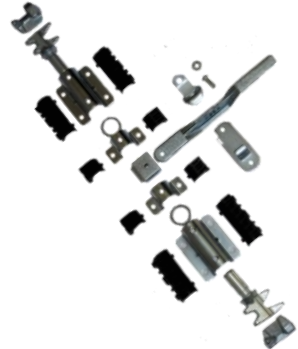
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E - Container Parts

No.	Product	Description	Image
1	Container Corner Castings	These castings are made from special steel designed for low temperature working at -40°C as standard. Corner castings are fundamental components for shipping containers which allow them to be connected to each other and lifted with standard lifting equipment. These are the world standard and in combination with standard set out dimensions creates the standard upon which all shipping container transport is based. A set of corner castings consists of 8 blocks. 2 x bottom right, 2 x bottom left, 2 x top right and 2 top left. The top and bottom corner castings are interchangeable as they are the same size and have the same openings. Individual corner castings are available for purchase.	  
2	Container Door Lock rod components	Lock rod assembly come as a complete set of components for a single container lock rod. The set excludes the steel tube that connects the components together, (Item 3). The set also excludes the fasteners to secure the assembled lockrod to the container door. The position and orientation of the handle must be fitted to suit the containers specific requirements. Various configurations available for difference applications.	
3	Lock rod tube	SANS 62 Heavy 25NB tube black. To be used in conjunction with lock rod components (item 2). Available in 3m lengths and to be but to size to suit either a GP or HC container.	

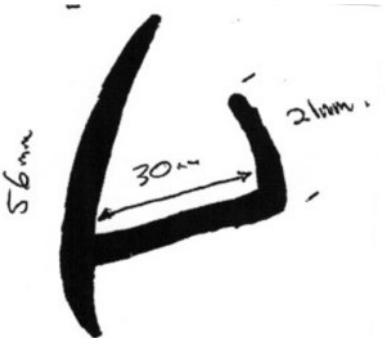
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E - Container Parts

No.	Product	Description	Image
4	Container Door J—Rubber	The rubber is used to seal the container doors from the ingress of water, moisture and dust once the doors closed and locked with the lock rods. The rubber is connected to the container with the use of steel backing plates and either screws or pop rivets. The rubber seals come in a roll that is cut to length for the sides of each door. The edges are glued together using rubber compound, thereby completing the seal.	 
5	Container door hinges	Comes as a complete assembly with the main hinge, pin and the 2 eyelets which are welded into the frame of the Shipping container. Components are supplied galvanised.	

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F - Accessories



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F - Accessories

No.	Product	Description	Image
1	Container Corner Jack	This product has been developed specifically to assist in the lifting of the corner of a shipping container to facilitate the levelling and or lifting thereof up to 200mm. This product is a bracket that attaches to the bottom corner casting and is used together with a hydraulic jack (8—10 ton) to slowly raise the container. It is recommended that the jack be used in pairs (2 or 4) to prevent the container from pivoting on 2 opposite points. Once the corner has been raised to the desired level, shims can be placed under the corner casting(s), there after the jack can be removed.	
2	Container Corner Jack with Trestle (New version in development)	This product is a variation of the container corner jack, with the ability to lock the height of the container once it has been raised with a hydraulic jack. Similar to a container jack, this unit can raise the corner of the container by approximately 200mm and by engaging the jacking rod, the jack is locked at the required height. The integrated rod has a safe working load of 4 tons per jack. Once locked, the hydraulic jack can be removed and the container will remain at the desired elevation.	

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F - Accessories

No.	Product	Description	Image
3	Container Castors	Shipping containers can be fitted with specialised heavy duty castors. Castors are available in various capacities: 1.8 Ton (7.6 Ton Container) 2.5 Ton (10 Ton Container) 3.5 Ton (14 Ton Container) 5.0 Ton (20 Ton Container) These castors are to be used on level even surfaces, i.e. screeded concrete floors. Manoeuvring a shipping container that is fitted with castors can be a challenge, due to weight. Additional equipment is recommended to be used to move the container around safely. To ensure that the shipping container does not move while work is being done, castors are fitted with breaks that are engaged and disengaged by foot. To assist with steering, castors are fitted with swivel necks that are also lockable. The twistlock has been modified to reduce the tolerance/ rattle fit between the twistlock and corner casting, thereby reducing the possibility for the con-	 
4	Domino Clamp	This unit is new to the market and offers the user the flexibility to quickly and easily secure structures and other items to the corner castings of a shipping container. A single tool is required to secure the unit to the container, thereafter, the item to be mounted is secured to the Domino Clamp by making use of the 4 tapped holes.	

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G - Lifting Equipment



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G - Lifting Equipment

No.	Product	Description	Image
1	Top Entry Lifting Lugs	These lifting lugs are inserted into the top corner castings and used together with a spreader bar or frame to ensure that the lugs apply a vertical load onto the container. Due to additional tensile stress that is placed onto the bottom beams of the container being lifted, it is recommended that these lugs be used on Grade A or good quality Grade B containers. These lugs, as a set of 4, have a maximum lifting capacity of 56 Tons.	
2	Side Entry Lifting Lugs—Inclined and vertical	These lifting lugs are inserted into the side hole of the bottom corner castings and are used with a lifting rig/spreader (beam, chains and shackles). They are available as vertical or diagonal units, depending on the application. As a set of 4, the lifting capacity is 50 tons.	
3	Side Entry Lifting Lugs—Heavy Duty	The model is laterally mounted at the bottom fixing hole on the container and has a spring-loaded bolt to prevent an accidental release. These lugs, as a set of 4, have a maximum lifting capacity of 40 Tons. Should be used with a container lifting rig/ spreader beam where the chains are parallel to the side of the container.	
4	Container Lifting Rig	Used in conjunction with side entry lifting lugs, this lifting frame, complete with adjustable chains, can be used to lift both empty and fully loaded shipping containers (6m and 12m). The single lifting point allows for simpler lifting with a crane or other lifting equipment. The required lifting capacity needs to be specified at the time of order. Max load: 36 Tons.	

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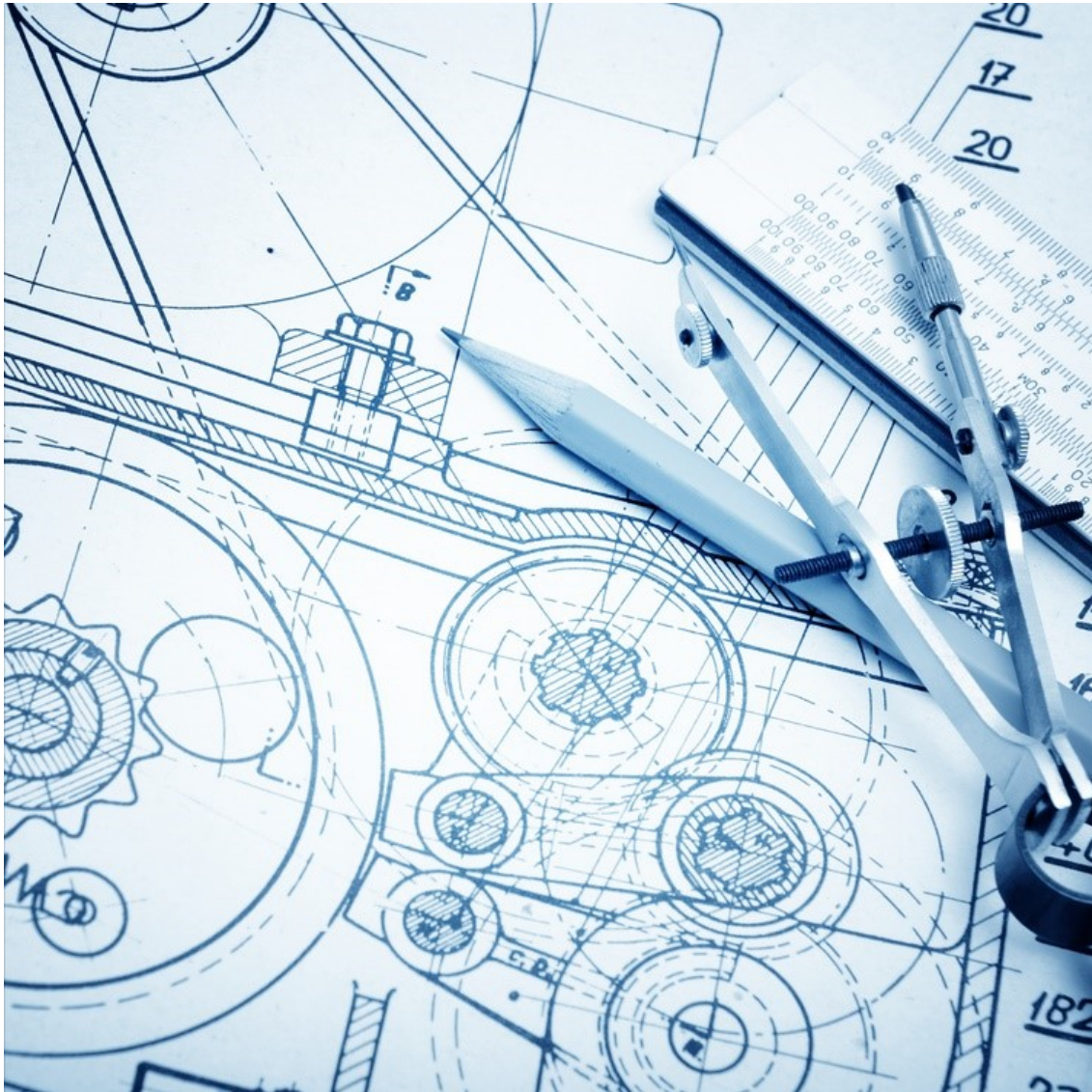
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H - Products in Development/ Coming Soon



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H1 - Products in Development

No.	Product	Description	Image
1	Container Door Ramp	Container ramps are designed to make loading and unloading safer, quicker and easier. The interior floor of shipping and storage containers is approximately 7 inches from the ground, which can make lifting large or heavy objects into the container difficult. Using a container loading ramp reduces health and safety risks associated with heavy lifting and if moving liquids, the risks of spillage during movement. Container ramps provide the perfect solution - they are designed to fit between the corner posts of the container doors to provide ramped access for pallets and forklifts, making light work of loading your container. Our ramps are fabricated to high standards and will be available with different loading capabilities. Approx. 1219mm x 1200mm, the ramp fits neatly fits the container entrance when one door is open, has a 5 tonne weight tolerance, and is suitable for pallet or fork lift loading. Made from heavy duty steel with an anti slip, fully welded Durbar floor plate. The ramp will incorporate various features making the handling and storage user friendly.	 
2	Bins (various sizes)	A shipping industry standard used to store lashing equipment onshore and on ships. Will be available in various standard sizes. Hot dipped galvanised for sea conditions ensuring a long service life. They are stackable up to 6 high and can be moved around using a fork-lift or can be lifted using a crane/ hoist using the integrated lifting holes where shackles can be attached.	

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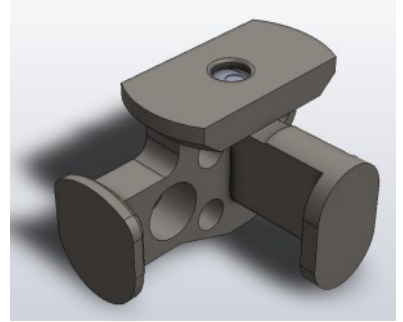
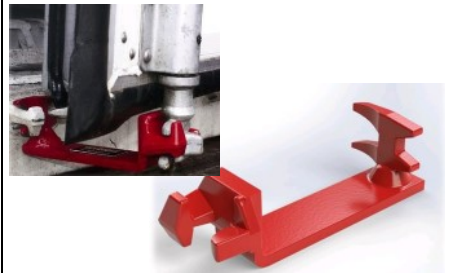
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H1 - Products in Development

No.	Product	Description	Image
3	Corner Casting Isolator (Container anti-lift)	There is a growing trend of shipping containers being uplifted by criminals using flatbeds and integrated cranes. This product has been in development for a while. By closing the holes on an ISO corner casting, it prevents the attachment of hooks to the casting and thus increases the difficulty to uplift a container. The unit locked once installed and can only be removed with a special key. The removable lock is integrated and protected by the main components and any physical damage only increases the unlikelihood of the removal of the device with the special key or heavy duty metal working equipment. Attempts to remove the device from the corner casting is likely to cause damage to the corner casting.	
4	Container offroad wheel brackets	Shipping containers can be difficult to move without the right equipment. These rugged and simple adapters mount to any shipping containers bottom corner castings so you can lift the other end and tow along like a trailer in your yard or around the farm. Paired with suitable hubs, rims and tyres, these are ideally suited to off road applications where the terrain is less than smooth or soft. Specifically designed for moving empty or partially filled containers whose weight does not exceed 6 tons (1.5 Tons per corner). Wheels are 6 stub hubs with heavy duty tyres.	
5	Container door stay	A handy device that facilitates a container door being left ajar while still preventing unauthorized access to the container. Can be used on GP, HP containers, Reefers as well as refrigerated truck bodies.	

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H1 - Products in Development

No.	Product	Description	Image
6	Horizontal Twist-lock with anchor plate	A variation on the horizontal twistlock, but instead of holding 2 containers together, this specific unit offers the user a method to attach items to corner castings. This unit can be used as an alternative to the Domino Clamps, but does not have same strength capabilities due to distance of the mounting plate to the corner casting. The mounting plate can be customised to suit a clients specific requirements. Installation is simple, as no tools are required.	
7	Horizontal Twist-lock with anchor ring	A variation on the horizontal twistlock, which offers the possibility to install an anchoring point onto corner castings, either to anchor the corner casting to the fixed point or to use the corner casting as an anchoring point for other structures.	

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H1 - Products in Development

No.	Product	Description	Image
6	Container internal framing	Together with Hilti, Twistlock Africa is applying Hilti's modular system to create a skeleton within a shipping container that will allow for the installation of equipment such shelving, piping, cable racking amongst other things. The system has the flexibility to be adapted to a users specific requirements with the application of a wide verity of different brackets and sections. With this exciting concept, the amount of holes that need to be drilled through the shell of the container is kept to a minimum.	
7	Container shelves	Together with the skeleton (item 6), in development shelves with a range of weight capabilities and sizes both in depth and height.	

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H2 - Coming Soon

No.	Product	Description	Image
1	Elevated lifting frame	An off the shelf lifting frame that easily attaches to the side of a shipping container to allow users to lift materials and equipment from the ground level to a container that is at elevated position. Has a carrying capacity of up to 2 tons and lifting height of up to 5m. Fitted with an electrically driven hoist for lifting and traversing along the length of the crawl beam. The crawl beam extends into the shipping container allowing the user to manoeuvre the load onto the floor of the container.	
2	Container access stairs	An off the shelf access platform that allows for easy access to shipping containers located at an elevated position. Complete with stair case, landing and handrailing.	

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H2 - Coming Soon

No.	Product	Description	Image
3	Flush Foundations	Flush foundations are available in single, double and quad configurations. Predominantly used on ships to allow shippers the flexibility to secure containers to bulk carriers. Twistlock Africa will soon be offering these to inland clients. These can be applied to structures but also to trucks.	
4	Raised Foundations	Raised foundations are available in single and double configurations. Predominantly used on container ships in the hull. Twistlock Africa will soon be offering these to inland clients. These can be applied to structures but also to trucks.	

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H2 - Coming Soon

No.	Product	Description	Image
5	Container corner jack stilts	These jacks are predominantly on sites to level offer containers. They offer users the ability to raise and lower a container as required. The draw back on these units is that they need to be used in combination with other devises to lift the container so that these units can be installed. These brackets would normally be installed at the time when the container is offloaded from the truck. Their lifting height is limited to 250mm, any height above this may cause instability to the structure. The basis of the design is standard scaffolding components.	
6	D-Ring shackle	Another standard shipping industry product. This D-ring shackle is supplied loose and welded into position by a qualified welder using an approved welding procedure. The capacity of this shackle is 38 Tons.	

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Technical Information (Coming Soon)

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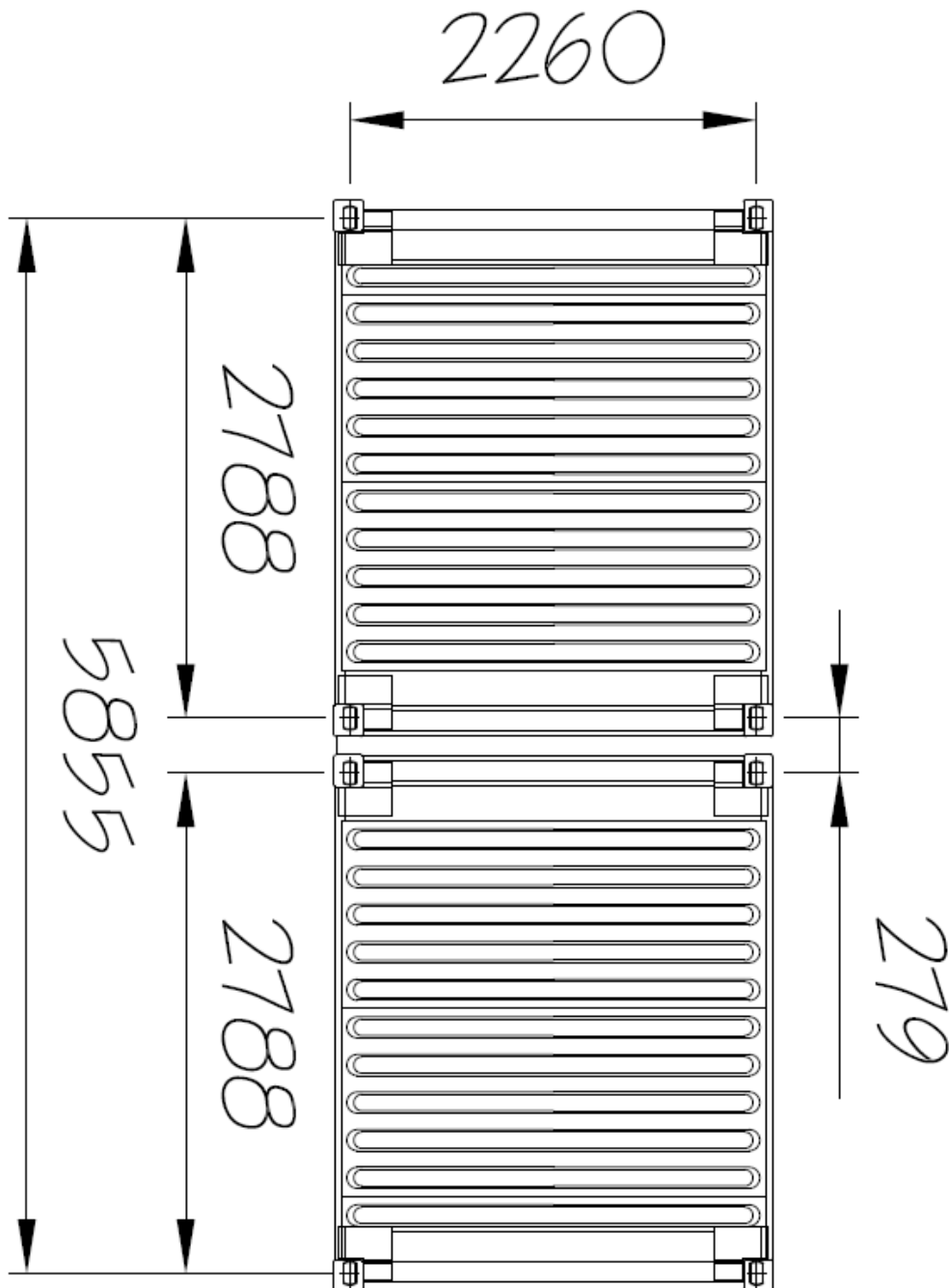


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Jun 2023

P1 - Container Setout - 10' / 20'



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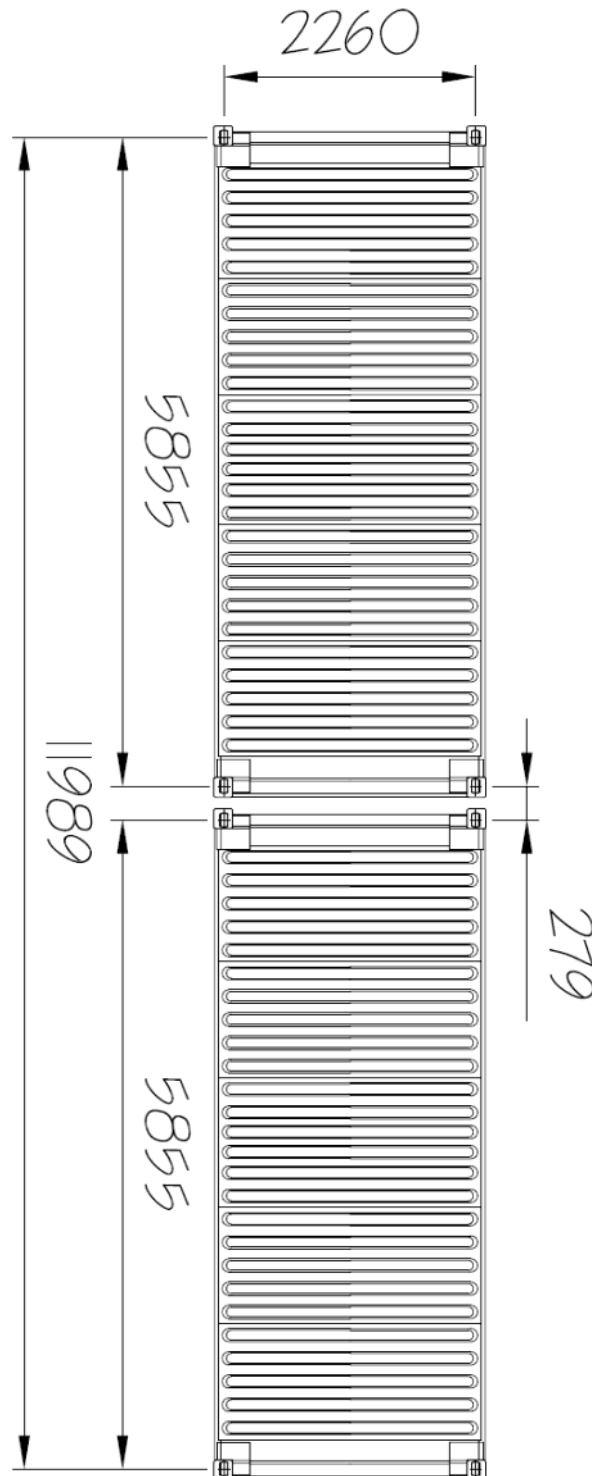


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P2 - Container Setout - 20' / 40'



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Q - Container ISO Standards

Contents

ISO 668:1995	Series 1 freight containers — Classification, dimensions and ratings
ISO 668:1995 / Amd 1:2005	Amendment 1:2005 to ISO 668:1995
ISO 668:1995 / Amd 2:2005	Amendment 2:2005 to ISO 668:1995, 45' containers
ISO 830:1999	Freight containers — Vocabulary
ISO 830:1999 / Cor 1:2001	Technical Corrigendum 1:2001 to ISO 830:1999
ISO 1161:1984	Series 1 freight containers — Corner fittings — Specification
ISO 1161:1984 / Cor 1:1990	Technical Corrigendum 1:1990 to ISO 1161:1984
ISO 1496-1:1990	Series 1 freight containers — Specification and testing — Part 1: General cargo containers for general purposes
ISO 1496-1:1990 / Amd 1:1993	Amendment 1:1993 to ISO 1496-1:1990, 1AAA and 1BBB containers
ISO 1496-1:1990 / Amd 2:1998	Amendment 2:1998 to ISO 1496-1:1990
ISO 1496-1:1990 / Amd 3:2005	Amendment 3:2005 to ISO 1496-1:1990
ISO 1496-1:1990 / Amd 4:2006	Amendment 4:2006 to ISO 1496-1:1990
ISO 1496-1:1990 / Amd 5:2006	Amendment 5:2006 to ISO 1496-1:1990, Door end security
ISO 1496-2:1996	Series 1 freight containers — Specification and testing — Part 2: Thermal containers
ISO 1496-2:1996 / Amd 1:2006	Amendment 1:2006 to ISO 1496-2:1996
ISO 1496-3:1995	Series 1 freight containers — Specification and testing — Part 3: Tank containers for liquids, gases and pressurized dry bulk
ISO 1496-3:1995 / Amd 1:2006	Amendment 1:2006 to ISO 1496-3:1995, Testing of the external restraint (longitudinal) dynamic
ISO 1496-4:1991	Series 1 freight containers — Specification and testing — Part 4: Non-pressurized containers for dry bulk
ISO 1496-4:1991 / Cor 1:2006	Technical Corrigendum 1:2006 to ISO 1496-4:1991
ISO 1496-4:1991 / Amd 1:1994	Amendment 1:1994 to ISO 1496-4:1991, 1AAA and 1BBB containers

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Q - Container ISO Standards

ISO 1496-5:1991	Series 1 freight containers — Specification and testing — Part 5: Platform and platform-based containers
ISO 1496-5:1991 / Amd 1 :1993	Amendment 1:1993 to ISO 1496-5:1991, 1AAA and 1BBB containers
ISO 1496-5:1991 / Amd 2:1994	Amendment 2:1994 to ISO 1496-5:1991
ISO 2308:1972	Hooks for lifting freight containers of up to 30 tonnes capacity — Basic requirements
ISO 3874:1997	Series 1 freight containers — Handling and securing
ISO 3874:1997 / Amd 1:2000	Amendment 1:2000 to ISO 3874:1997, Twistlocks, latchlocks, stacking fittings and lashing rod systems for securing of containers
ISO 3874:1997 / Amd 2:2002	Amendment 2:2002 to ISO 3874:1997, Vertical tandem lifting
ISO 3874:1997 / Amd 3:2005	Amendment 3:2005 to ISO 3874:1997, Double stack rail car operations
ISO 6346:1995	Freight containers — Coding, identification and marking
ISO 8323:1985	Freight containers — Air/surface (intermodal) general purpose containers — Specification and tests
ISO 9669:1990	Series 1 freight containers — Interface connections for tank containers
ISO 9669:1990 / Amd 1:1992	Amendment 1:1992 to ISO 9669:1990, Sections 3 and 4
ISO 9711-1:1990	Freight containers — Information related to containers on board vessels — Part 1: Bay plan system
ISO 9897:1997	Freight containers — Container equipment data exchange (CEDEX) — General communication codes
ISO 9897:1997 / Cor 1:2001	Technical Corrigendum 1:2001 to ISO 9897:1997
ISO 10368:2006	Freight thermal containers — Remote condition monitoring
ISO 10374:1991	Freight containers — Automatic identification
ISO 10374:1991 / Amd 1:1995	Amendment 1:1995 to ISO 10374:1991
ISO 14829:2002	Freight containers — Straddle carriers for freight container handling — Calculation of stability
ISO/TR 15069:1997	Series 1 freight containers — Handling and securing — Rationale for ISO 3874 Annex A
ISO/TR 15070:1996	Series 1 freight containers — Rationale for structural test criteria
ISO/TR 15070:1996 / Amd 1:2005	Amendment 1:2005 to ISO 15070:1996, Guidance on structural integrity
ISO/PAS 17712:2006	Freight containers — Mechanical seals
ISO 18185-3:2006	Freight containers — Electronic seals — Part 3: Environmental characteristics

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R - Engineering Information

No.	Technical information
R1	General*
R2	Container Strength*
R3	Container Sizes and Distances*
R4	Safe Lifting of Containers*
R5	Guidelines For Container Corner Fittings**
R6	Typical SWL for container securing devices***

*Information presented in this section is from "Container Technics NV" Catalogue and brochure

** Information presented in this section is from "IACS Rec 1996. Con"

***Class guideline — DNVGL-CG-0060. Edition October 2015, amended February 2016

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R1 - General

Shipping containers are standardised according to ISO standards such as ISO 668, 1496, ...

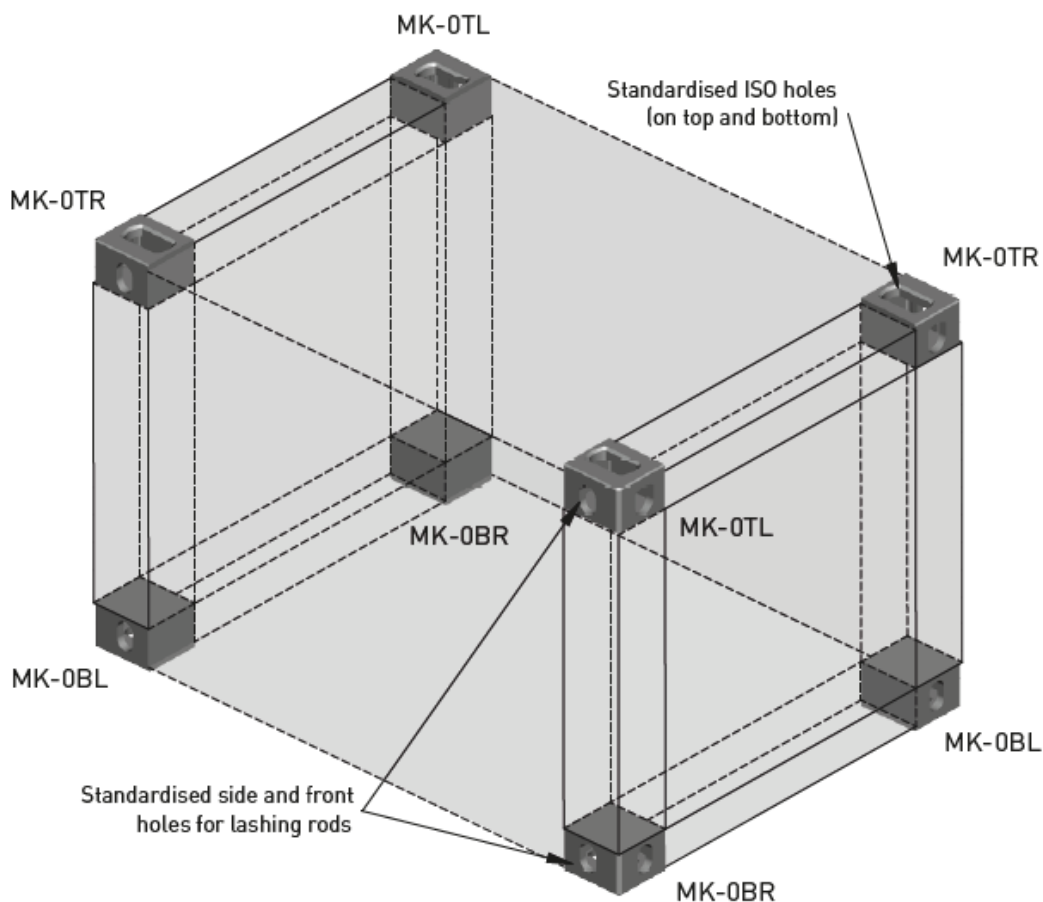
From a structural point of view, a container consists of a strong frame at the front side and a strong frame with a door at the aft side. Each of these frames is composed of 2 vertical corner posts, 2 horizontal girders at the bottom and on top, and 4 corner castings (2 at the bottom, 2 on top, see also MK-0). These elements are designed to take all the external loads working on the container.

The rest of the container (roof, longitudinal walls, and bottom) is not taken into account for securing calculations,

because these elements are weak in comparison to the end frames. Only for special, by the classification society defined, cases may the strength of these longitudinal elements be taken into account for the securing calculations.

Containers can be secured to a foundation or to each other by connecting elements fitting into the ISO-holes located the underside of the bottom corner castings and in the upper side of the top corner castings.

Containers can be additionally secured or stiffened by lashing elements fitting into the standardised front and side openings of the top and bottom corner castings.



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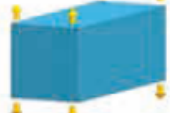
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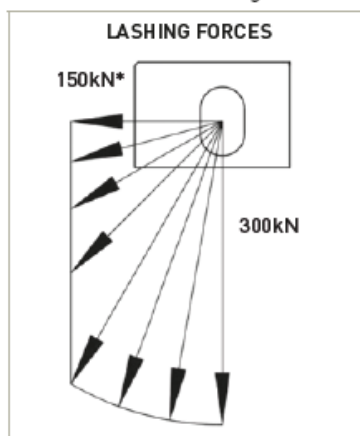


R2 - Container Strength

■ ALLOWABLE FORCES ON CONTAINERS (In kN)

			STANDARDIZATION OF CLASSIFICATION SOCIETY					
			ISO	LRS	BV	DNV-GL	ABS	RINA
RACKING FORCE 	Door and front wall		150	150	150	150	150	150
	Side walls		75	150	100	150	125	100
	Side walls of open containers			75	75	75	75	75
VERTICAL TENSION FORCE 	Top	20´	118	250	250	250	250	250
		40´	150					
	Bottom	20´	110	250	250	250	250	250
		40´	140					
VERTICAL COMPRESSION FORCE 	Corner post		942	848	848	848	848	848
	Bottom corner	20´	1048	954	ns	ns	954	ns
		40´	1077					
HORIZONTAL TENSION FORCE 	Top	20´	150	340	200	200	250	200
		40´				250		
	Bottom	20´	150	500	300	200	350	300
		40´				250		
HORIZONTAL COMPRESSION FORCE 	Top	20´	100	340	200	250	250	200
		40´						
	Bottom	20´	150	500	300	400	350	300
		40´						

The allowable forces acting between two containers (for instance in buttresses) are to be taken as the appropriate sum of top and bottom forces.



* max. Horizontal forces 225 kN acc. to LRS

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R3 - Container Sizes and Distances

Dimensions of various container types can be found in the table below.

Standardised longitudinal centre-to-centre distance between the holes of the end sockets of two adjacent 20' containers is 279mm in order to fit into one 40' module. (The same is valid for two 10' containers in a 20' module)

Transversal centre-to-centre distance between the side sockets of two adjacent containers is not fully standardised. Because – for practical reasons – a clearance of minimum 20 to 35mm is required between containers, transversal centre-to-centre distance between the holes of two 8' wide containers is standardised at 203mm. However, more and more pallet wide EURO-containers of 2500mm width are transported: transversal centre-to-centre distance between two 2500mm wide contain-

ers is standardised at 258mm. Other transversal centre-to-centre distances encountered are: 216mm, 265mm or 365mm (for two adjacent 2600mm wide containers).

In ships with cell guides, the cell guides are in most cases designed for 8' wide containers; so no 2500mm wide containers can be carried in the cell guide system. The lay-out of a cell guide system can be based on 2500mm wide containers: in the case of 8' wide containers being carried in such a system, compensating pieces have to be provided in order to limit the clearance of these 8' wide containers in the 2500mm cell guide system.

Cell guides are to be constructed with maximum 25mm clearance transversally and 38mm longitudinally (therefore the distance between the guides = container width + 25mm, container length + 38mm).

■ SIZES AND DISTANCES FOR VARIOUS CONTAINER TYPES

CONTAINER SIZE/TYPE	CONTAINER SIZES (mm)			CENTRE-TO-CENTRE (mm)		MAX. WEIGHT (t)	REMARKS
	LENGTH	WIDTH	HEIGHT	LENGTH	WIDTH ¹		
10' x 8' x 8'	2991	2438	2438	2787	2259	10,16	ISO 668
10' x 8' x 8'6"			2591				
20' x 8' x 8'	6058	2438	2438	5853 ²	2259	24,0	ISO 668
20' x 8' x 8'6"			2591				
20' x 8' x 9'			2743				
20' x 8' x 9'6"			2896				
20' x 2500 x 8'6"	6058	2500	2591	5853	2259	24,0	'EURO'
20' x 2500 x 9'6"			2896				
24' x 8' x 8'	7315	2438	2438	7108		24,95	'MATSON'
24' x 8' x 8'6"			2591				
24,5' x 8'6"5/32 x 8'6"	7430	2595	2591	5838/7225 ³	2259		ISO
24,5' x 8'6"5/32 x 9'6"			2896				
30' x 8' x 8'	9125	2438	2438	8918	2259	25,4	ISO 668
30' x 8' x 8'6"			2591				
35' x 2430 x 2590	10659	2438	2603		2134	27,4	'SEA LAND'
40' x 8' x 8'	12192	2438	2438	11985	2259	30,48	ISO 668
40' x 8' x 8'6"			2591				
40' x 8' x 9'			2743				
40' x 8' x 9'6"			2896				
40' x 2500 x 8'6"	12192	2500	2591	11985	2259	30,48	'EURO'
40' x 2500 x 9'			2743				
40' x 2500 x 9'6"			2896				
43' x 8' x 8'6"			2591				
45' x 8' x 9'	13716	2438	2743	11985/ 13509	2259	30,48	US standard
45' x 8' x 9'6"			2896				
48' x 8'6" x 9'6,5"	14630	2600	2900	11985/14423	2259	30,48	US standard
49' x 8'6"5/32 x 8'6"	14953	2595	2591	11985/14728	2259	30,48	ISO
49' x 8'6"5/32 x 9'6"			2896				
53' x 8'6" x 9'6,5"	16154	2600	2900	11985/16147	2259	30,48	US standard

■ TOLERANCES

Width: +0, -5mm for all containers
 Height: +0, -5mm for all containers
 Length: +0, -6mm for 10' - 24,5' containers
 +0, -10mm for 30' - 53' containers

¹ Transverse offset (distance from centre point to centre point of ISO holes) of all containers is 2259mm standard, except for 'SEALAND' containers.

² Two 20' containers behind each other fit the offsets of one 40' container with a spacing of 76mm between the two containers (or 279mm c/c spacing).

³ Two 24,5' containers behind each other fit the offsets of one 49' container with a spacing of 51mm between the two containers (or 279mm c/c spacing).

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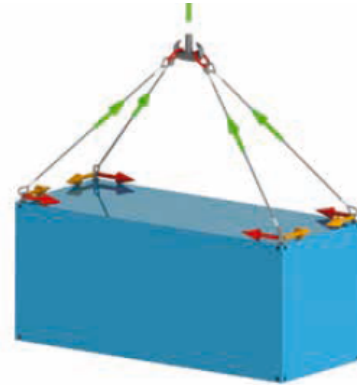


R4 - Safe Lifting of Containers

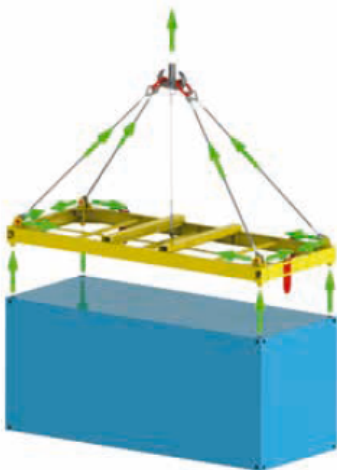
Hundreds of thousands of containers are lifted every day. Lifting a container is however not without risks. For a number reasons (limited lifting height, limited crane capacity, ...) it is often asked if a spreader is really necessary to lift a container. The answer is – in most cases – yes.

Why lifting a container by its top corners, using only a 4-legged sling, is not permitted

A typical 4-legged sling, attached to the four top corners of a container induces compression loads in the roof plane of the container, especially lengthwise. Containers are not designed to take this compression load at the roof plane in a lengthwise direction. The actual strength of the roof varies from container to container, depending on the manufacturer, age, size ... Therefore it is possible that several lifts are made with only a 4-legged sling, and that no particular problem is noticed. The operator is lured into believing that this is a safe way of handling the containers. However, due to this practice, unseen damage is done to the container and every lift can lead to the instant breaking of the container.

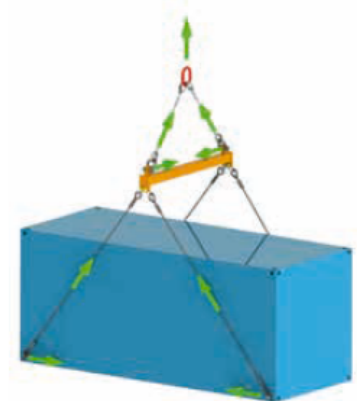


Why a spreader should be used between the 4-legged sling and the container



When using a spreader like the MK-20 or MK-40, the compression load is no longer induced on the roof of the container, but directly on the spreader (which is designed for this load). The top frame of the container is thus free of compression loads. The container is now lifted vertically, which is the only configuration for top lifting, allowed by the international standard (ISO 1496).

The use of a (semi-automatic) spreader also has several other advantages, such as quicker handling of the containers and less operators required.



What to do if no spreader is available

There is still a possibility to lift a container without a spreader, using bottom lifting parts such as MK-5L & MK-5R. These parts fit the side holes of the bottom corners of the container. In this case, the compression load in a lengthwise direction is taken by the floor frame of the container, which is a lot stronger than the roof plane.

The transverse compression load is absorbed by the crossbar. This method of lifting is also mentioned in the ISO 1496 standard.

Another advantage of this system is that the required lifting height is in most cases less than when using a spreader.

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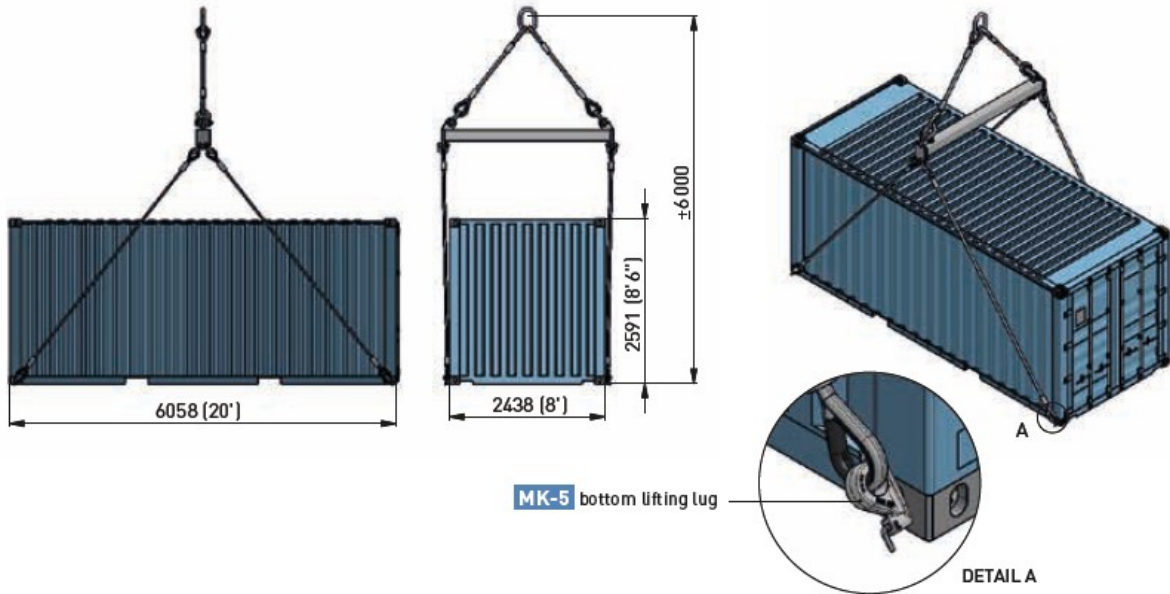
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R4 - Safe Lifting of Containers

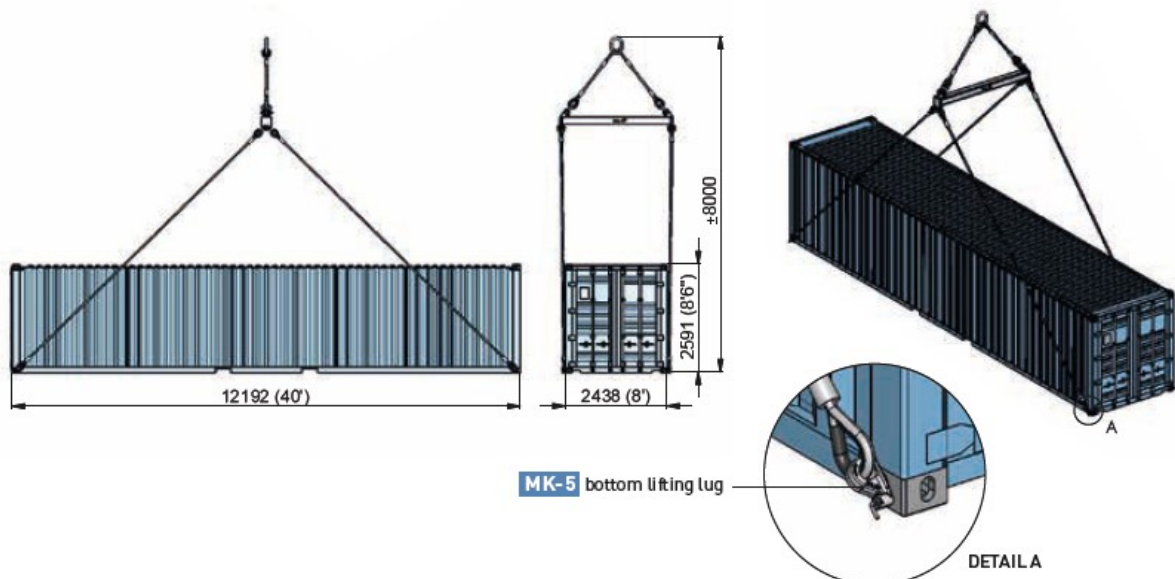
20' with bottom lugs

Bottom lifting set for 20ft
Standard capacities: 25t, 32t, 40t and 56t



40' with bottom lugs

Bottom lifting set for 40ft
Standard capacities: 25t, 32t, 40t and 56t



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R5 - Guidelines For Container Corner Fittings

1. Scope

1.1 These requirements apply to container corner fittings intended to be used for the fabrication of freight containers.

1.2 The dimensions of the container corner fittings dealt with in these requirements must comply with the latest edition of the International Standard ISO 1161. The Society may require manufacturing drawings to be submitted for approval.

2. Approval

2.1 On agreement with the Classification Society, corner fittings may be manufactured using steel casting and other than casting procedures. For this matter, composite corner fittings may be manufactured using welding.

2.2 The corner fittings are to be manufactured at enterprise approved by the Society. In addition, a special approval test to verify the properties of the materials and welding consumables for container corner fittings is mandatory. The scope of this approval test will be fixed by the Society in each individual case.

2.3 The approval is to be applied for with the Society in writing. The application is to be accompanied by the manufacturer's specification, giving full details of the chemical analysis, mechanical properties, heat treatment and welding procedures when manufacturing and welding repair procedures for the corner fittings.

3. Cast steel corner fittings

3.1 Chemical analysis and deoxydation practice.

The castings are to be manufactured by electric furnace or basic oxygen process, or other processes specially approved by the Society and fully killed. The limiting values for the chemical composition are to comply with Table 1.

Table 1 Chemical composition (ladle analysis)¹⁾

Chemical composition %										
C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Alsol	Cr+Ni+Cu+Mo 2)
max		max	max	max	max	max	max	max	min	max
0,20	0,90 to 1,50	0,50	0,035	0,035	0,25	0,30	0,20	0,08	0,015	0,70
1) The carbon equivalent $Ceq = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} \%$										
2) Aluminium may be replaced partly or totally by other fine graining elements as stated in the approved specifications.										

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R5 - Guidelines For Container Corner Fittings

3.2 The application of composition of materials other than specified in table 1 (including low-alloyed, carbon-manganese micro-alloyed steels) may be allowed coming into the agreement with the Classification Society provided they are in compliance with the technical specifications and there are confirmations of good weldability.

3.3 Depending on the mechanical characteristics indicated in the Table 2 the chemical composition of steel (including the grain-refining elements) is to be stated in the approved specifications. Additionally the cold cracking susceptibility for evaluating weldability should be calculated from the ladle analysis in accordance with the following formula:

$$CEN(\%) = C + A(C) \times \left\{ \frac{Si}{24} + \frac{Mn}{6} + \frac{Cu}{15} + \frac{Ni}{20} + \frac{Cr + Mo + Nb + V}{5} + 5B \right\}$$

The values of A(C) are as follows:

C(%)	0	.08	.12	.16	.20	.26
A(C)	0.500	.584	.750	.916	.980	.998

The maximum admissible value of carbon equivalent CEN is to be agreed with the Classification Society and included in the approved specification.

3.4 Weldability of steel should be demonstrated by the manufacturer during the approval procedure to the satisfaction of the Classification Society.

3.5 When determining the chemical composition of the fittings material the design temperature and the range of ambient temperatures are to be considered to take into account the temperature range during the transportation at different climate conditions. In any case material resistance for the brittle failure should be guaranteed when normally operating at the ambient temperature from -20°C till + 50°C besides the value of impact energy should be in compliance with the table 2. More wide temperature range (lower -20°C and higher +50°C) may be accepted as agreed by the Classification Society and the Client in accordance with the national standards.

3.6 Heat treatment

All castings are to be suitably heat treated.

3.7 Mechanical Properties

The requirements given in Table 2 are to be fulfilled. The values are applicable to specimens taken from separately cast test pieces.

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R5 - Guidelines For Container Corner Fittings

Table 2 Mechanical Properties

Yield strength R_{eH} [N/mm ²] min	Tensile strength R_m [N/mm ²]	Elongation A_5 [%] min	Reduction of area Z [%] min	Impact Energy KV ¹) (Joule) min at -20°C at -40°C ²)	
220	430 to 600	25	40	27	21
1) Average value on 3 ISO-V-notch impact specimens acc. to UR-W2. One individual value may be below the average value but not lower than 70% of the average. 2) The tests may be carried out at the Client's requests.					

3.8 Freedom from defects

All castings must have a clean surface compatible with the condition of manufacture. Defect liable to impair the use of the fittings, e.g. sizeable non-metallic inclusions, shrinkage cavities, blowholes and cracks are not allowed. They may be removed by one of the procedures mentioned in para 7.

4. Test and inspection

4.1 General requirements

The manufacturer should either be approved on a quality assurance scheme acceptable to the Society or should submit the castings to the individual Society's inspection.

4.2 Chemical analysis

The manufacturer has to determine the chemical composition of each heat.

4.3 Mechanical and impact test

For test sampling the castings are to be grouped into test units originating from the same heat and furnace lot. From each test unit one tensile and one set of notched bar impact test specimens are to be taken and tested. The notched bar impact is to be carried out at -20°C or at -40°C.

4.4 Visual inspection and dimensional checks

The manufacturer is to inspect all castings 100% including dimensional checks and remove defective castings from the consignment. If applicable (cf.4.1) the sound castings are to be presented to the Society's Surveyor for at random inspections.

The dimensions and tolerances of the corner fittings shall conform to figures 1,2,3 and 4.

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R5 - Guidelines For Container Corner Fittings

4.5 Non-destructive inspection

One casting from each heat or from every 400 pieces, whichever is the minimum is to be subjected to a volumetric examination in accordance with an acceptable national standard.

4.6 Test loads

Container corner fittings are to withstand the following design loads calculated in accordance with the requirements of ISO 1496-1 1990 (E) and ISO 1161-1984 E. The tests shall be carried out at 1,5% of each batch of fittings submitted (a batch shall consist of not more than 800 pieces).

4.6.1 Stacking

Top corner fitting

[superimposed load offset 25,4mm (1in)
laterally and 38 mm (1 1/2in)
longitudinally]

Design load 848 kN

Bottom corner fitting

(resting on flat support)

Design load 954 kN

Bottom corner fitting

[container offset 25,4mm (1 in)
laterally and 38 mm (1 1/2 in)
longitudinally]

Design load 848 kN

4.6.2 Lifting

Top corner fitting

(also with hook or shackle)

Design load 150 kN

Bottom corner fitting:

sling at 30 to horizontal

Design load 300 kN

4.6.3 Longitudinal restraint

Bottom corner fittings

(two fittings carrying loads)

Design load 300 kN
(2g x 1R)

4.6.4 Lashing and securing

Top and bottom fittings,
front and side apertures

Design load 300 kN
vertically)

Top and bottom fittings,
front and side apertures
(figure 5)

Design load 150 kN
(horizontally)

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R5 - Guidelines For Container Corner Fittings

4.6.5 Misgather

Bottom corner fittings

[contact area is 25 mm (1in) x
6 mm (1/4 in) on the bottom face]
(figure 6)

Design load 150 kN

5. Markings

5.1 Markings by the manufacturer

The castings must be marked at the inside with at least the following symbols:

- Manufacturer's brand mark
- Heat number of abbreviated symbol enabling retracting of the cast
- The Society's classification initials

The above symbols may be cast in at the inner surface of each fitting.

5.2 Surveyor's stamp

The surveyor will stamp every piece inspected by him with his personal stamp.

6. Certificates

For each consignment the manufacturer must supply to the Surveyor a certificate or delivery specification containing at least the following details:

- a) Purchaser and order number
- b) Type of corner casting and cast steel grade
- c) Drawing and/or specification number
- d) Method of manufacture
- e) Heat number and chemical composition
- f) Details of the heat treatment
- g) Number and weight of the castings
- h) Results of inspections and mechanical tests

7. Repair of defects

7.1 Grinding

Minor defects are to be removed by grinding provided the depth below the ground area does not exceed the allowable minus tolerance.

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R5 - Guidelines For Container Corner Fittings

7.2 Welding

Defects, which cannot be removed by grinding may be repaired by grinding or chipping followed by welding, provided their depth does not exceed 40% of the wall thickness and the following conditions are met:

7.2.1 No welding is to be carried out on pieces being in the “as cast” condition.

7.2.2 Preheating to 80-100°C will be necessary if the temperature of the piece is below 5°C or if moisture is present in the weld areas.

7.2.3 The weldings are to be performed by qualified welders in accordance with a qualified welding procedure.

7.2.4 All welded pieces should be subject to post weld heat treatment at about 550°C.

7.2.5 The welded areas are to be ground or machined flush with the adjacent surface and inspected for defects by suitable test methods, e.g. magnetic particle or dye penetrant inspection.

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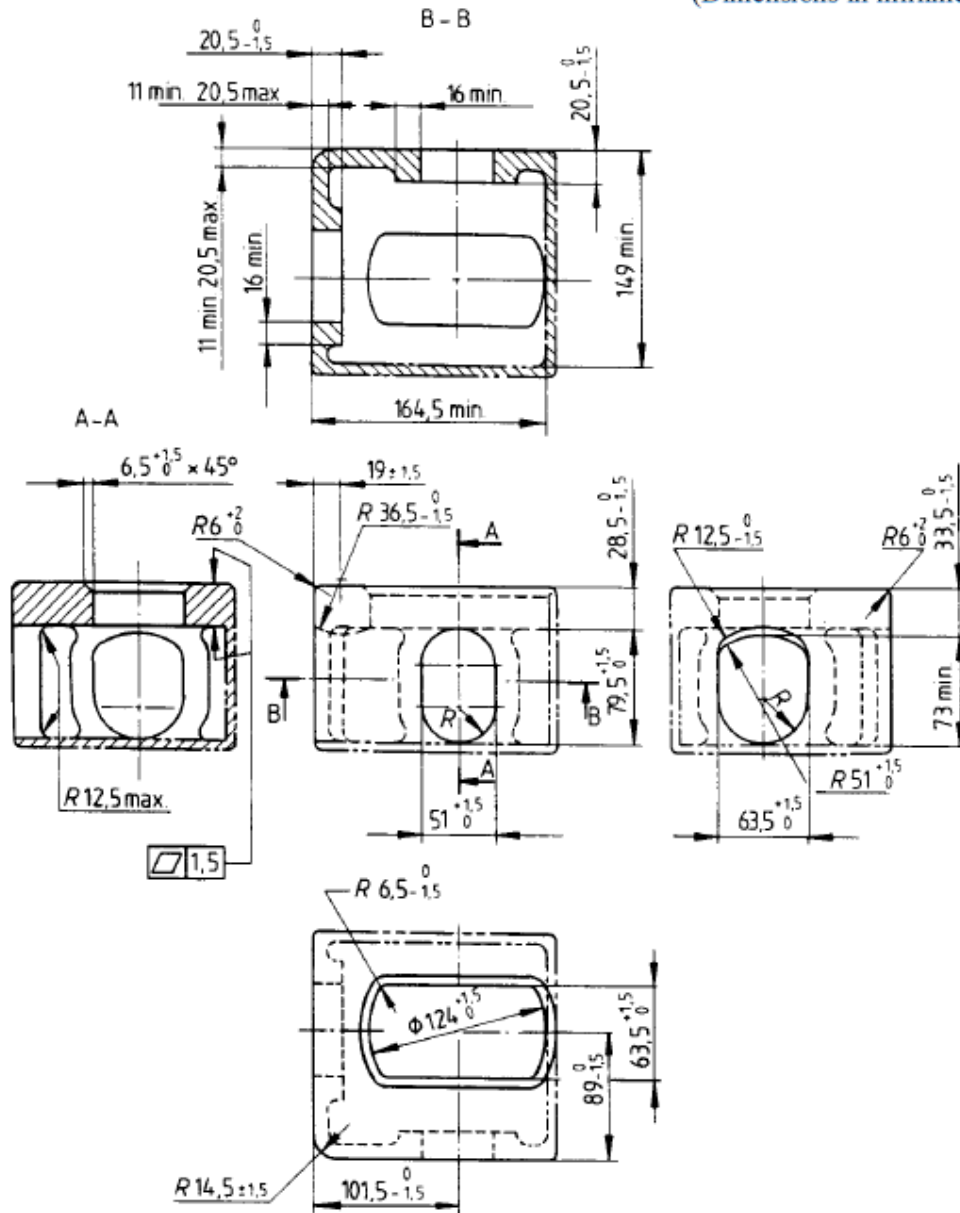
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R5 - Guidelines For Container Corner Fittings

(Dimensions in millimetres)



NOTES

- 1 Solid and broken lines (— and ---) show surfaces and contours which shall be physically duplicated in the fitting.
- 2 Phantom lines (— -- — -- —) show optional walls, which may be used to develop a box-shaped fitting.

FIGURE 1 - Top corner fitting - Dimensions in millimetres

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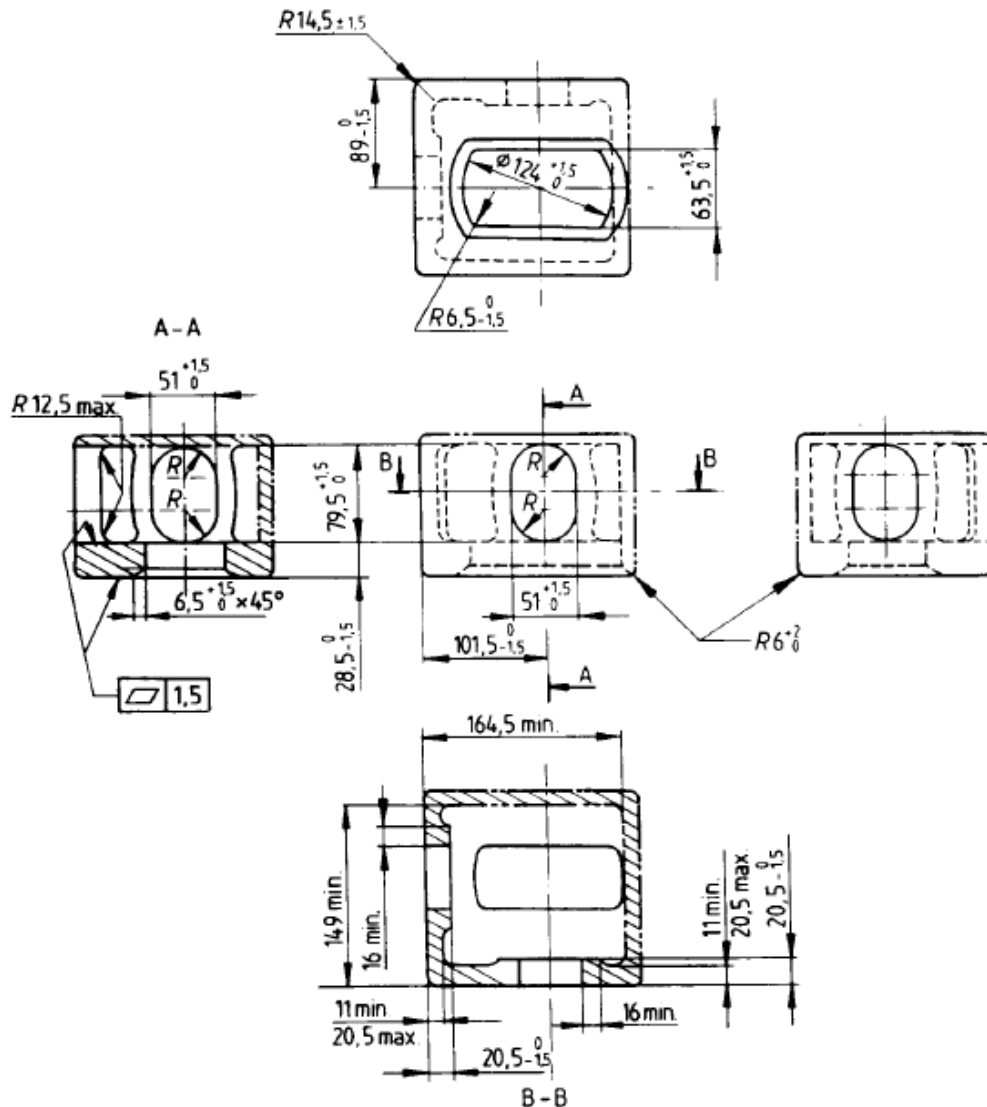
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R5 - Guidelines For Container Corner Fittings

(Dimensions in millimetres)



NOTES

- 1 Solid and broken lines (— and ---) show surfaces and contours which shall be physically duplicated in the fitting.
- 2 Phantom lines (— -- — -- —) show optional walls, which may be used to develop a box-shaped fitting.

FIGURE 3 - Bottom corner fitting - Dimensions in millimetres

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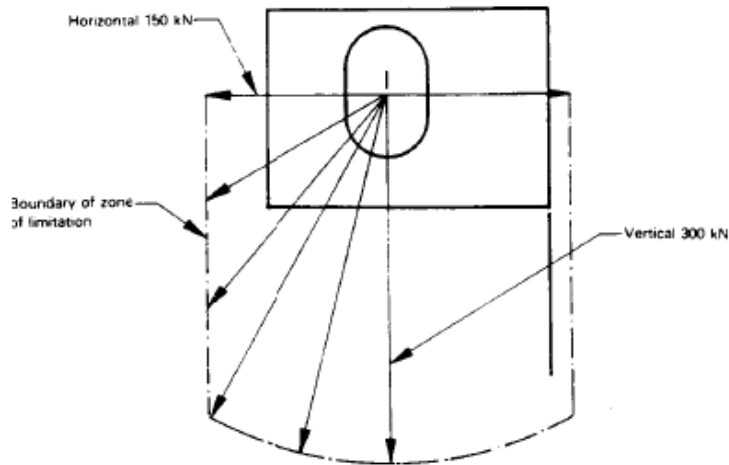


Figure 5 – Limits of loads due to lashing and securing

Figure 5 - Limits of loads due to lashing and securing

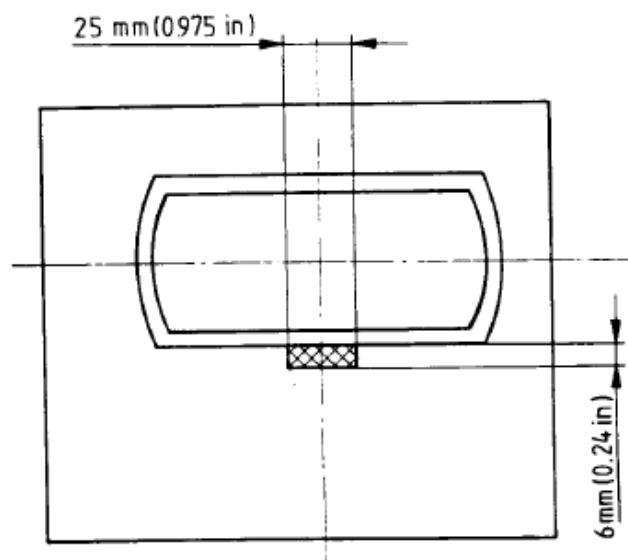


Figure 6 - Bottom view of bottom corner fitting showing contact area (shaded) for mis-gather (push-up) load

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R5 - Guidelines For Container Corner Fittings

8 Scope

8.1 These requirements apply to container composite corner fittings manufactured using welding, namely,

- corner fittings welded totally from rolled or stamped components (sides and edges),
- cast or stamped corner fittings with a welded-in panel (an additional wall which makes the fitting box-like in shape as required by ISO 1161).

9 Requirements for base materials

9.1 Composite corner fittings may be manufactured from combinations of the following materials:

- carbon-manganese steel with a chemical composition in accordance with Table 1 for the manufacture of corner fittings components by casting,
- carbon-manganese micro-alloyed steel, low-alloy steel for the manufacture of corner fitting components from rolled and stamped products.
- application of hull structural steel of appropriate class according to w11, is permitted.

9.2 Steel for corner fitting components assembled from rolled and stamped products and castings by means of welding should be manufactured in accordance with approved national standards and should be supplied fully killed, fine-grain treated and in a heat-treated condition. If the steel for composite corner fittings is manufactured at enterprise other than the fitting the Certificate containing data on chemical composition and mechanical properties of the steel shall be submitted to the surveyor as well as the value of carbon equivalent at his request.

9.3 The content of chemical elements in the steel is to be in accordance with the requirement for the value of the carbon equivalent Ceg or CEN in conformity with para 3.1.

9.4 The minimal requirements for the mechanical properties of steel used for composite corner fitting components irrespective of the manufacturing procedure (casting, forging, rolling) are to be in compliance with Table 2.

Forged and rolled steel for composite, fittings shall withstand bending test over the mandrel of thickness equal two thicknesses of metal at the angle of 120°.

9.5 Steels the mechanical properties of which differ from those required above are to be specially approved by the Classification Society.

10. Requirements for welding consumables and welding procedure

10.1 Welding consumables for composite corner fittings are to be approved by the Classification Society and are to comply with standards approved by the Society.

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R5 - Guidelines For Container Corner Fittings

10.2 Welding consumables are to be chosen with regard for the mechanical properties and chemical composition of the base metal and the working temperature range should be taken into consideration, when choosing the base materials as well.

10.3 Welding of composite corner fittings manufactured from cast, stamped and rolled components should be effected with welding consumables of low-hydrogen type. On agreement with the Classification Society, austenitic welding consumables may be used.

In this case, the welding consumables composition is to be chosen in such a way as to eliminate corrosion as a result of an eventual difference of potentials between base metal, heat-affected zone and weld metal.

10.4 The welds of corner fitting components (walls, surfaces) which take up principal loads are to be executed with full penetration.

10.5 The necessity of preheating before welding and of postheat treatment is determined proceeding from the chemical composition of the base and weld metal, procedure of welded fitting components manufacture (casting, forging, rolling).

When manufacturing welded fittings with cast components, the requirements of Section 7.2 should be observed.

10.6 All the welding processes applied by the manufacturer for composite corner fittings are to be approved by the Classification Society proceeding from the results of tests agreed with the Surveyor of the Classification Society and conducted in his presence.

10.7 The welding processes applied by the manufacturer are to comply with the requirements of this Section, with national and international standards which is to be confirmed by the Surveyor of the Classification Society when approving the process.

10.8 All welding operations are to be carried out by certified welders on the basis of national or international standards. The manufacturer's reports of welder certification should be submitted for the consideration of the Classification Society.

11. Testing and inspection when manufacturing

11.1 To test the weld quality of corner fittings, inspections are to be conducted as follows:

- external inspection and measurement,
- non-destructive testing (ultrasonic or radiographic testing as agreed with the Classification Society).
- testing of the mechanical properties of base metal and welded joints,
- testing by working loads in accordance with ISO 1491/1.

The batch of fittings submitted for testing shall include the articles made according to the same technology (of the same material using the same regime of heat treatment and welding etc.)

The number of fittings in the batch shall not be more than 800 pieces.

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R5 - Guidelines For Container Corner Fittings

11.2 100% of corner fittings and their welds should undergo external inspection and measurement. The dimensions and tolerances of the corner fittings shall conform to figures 1,2,3 and 4.

The quality of welded joints is assessed on the basis of national and international standards approved by the Classification Society.

11.3 2% of each batch of corner fittings (for the definition of the batch, see para 4.5), but not less than 3 pieces should undergo ultrasonic or radiographic testing. Quality assessment is effected on the basis of national or international standards approved by the Classification Society. Cracks and lack of penetration in welded joints are not permitted.

If the manufacturer has a quality control system approved by the Classification Society, or if the good quality of fittings manufactured is confirmed during a long period of time, the scope of radiographic (ultrasonic) testing may be reduced or it may be substituted by magnetic particle or dye penetrant testing at the discretion of the Surveyor of the Classification Society.

11.4 Subject to the testing of mechanical properties of base metal and welded joints in fittings is each heat and each batch of fittings which consists of 800 pieces. For this purpose, the following mechanical tests are made:

- tensile test on three weld specimens,
- impact test on three specimens representing the weld metal and three specimens representing the heat-affected zone,
- determining the heat-affected zone hardness on a fillet weld with full penetration revealed on the macrosection.

11.5 The mechanical testing of welds is to be effected on the basis of national or international standards approved by the Classification Society and the yield strength of the weld is not to be less than the corresponding values for the base metal and is to comply with the value contained in Table 2. At the discretion of the Classification Society for confirming the base metal properties the additional specimens may be cut off the fittings for tensile and impact tests. During initial approval the performance of these tests is mandatory.

The impact energy value obtained when testing the weld metal and heat-affected zone must not be less than 27J at a test temperature of -20°C.

The hardness of the weld and heat-affected zone should not exceed 350 HV.

11.6 The testing of a welded corner fitting with working loads should be conducted in conformity with para 4.6.

12 Marking and documentation

12.1 The marking of welded corner fittings and the accompanying documentation as necessary for each batch are to be in compliance with Sections 5 and 6.

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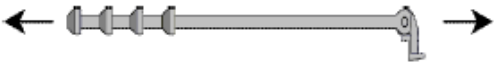
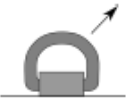
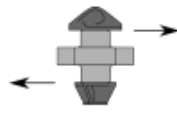
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R6 - Typical SWL for container securing devices

Table 2 Typical SWL values for container securing devices

Item	Type	Figure	Safe Working Load (SWL), in kN	Proof Load (PL) , in kN	Min. Breaking Load (BL) , in kN
General note:		Deck	SWL	1.25 SWL	2.0 SWL
		Hold	SWL	1.1 SWL	1.33 SWL
<i>Lashings</i>					
1.1	Lashing rod		245	307	490
1.2	Lashing chain		80	100	200
1.3	Lashing steel wire rope		200	250	450
2	Turnbuckle		245	307	490
3	Penguin Hook		245	307	490
4	D-Ring		245	307	490
5	Lashing plate		245	307	490
<i>Twist locks and deck connections</i>					
6	Twist lock (single)		210	263	420

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R6 - Typical SWL for container securing devices

Item	Type	Figure	Safe Working Load (SWL), in kN	Proof Load (PL) , in kN	Min. Breaking Load (BL)), in kN	
			250	313	500	
7	Flush ISO socket		250	313	500	
8	Pedestal ISO socket		250	313	500	
			210	263	420	
9	Dove tail socket with twist lock		Tension	250	313	500
			Shear	210	263	420
Hold and block stowage						
10	Stacker (single)		210	263	420	
11	Stacker (double)		560	620	730	

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R6 - Typical SWL for container securing devices

Item	Type	Figure	Safe Working Load (SWL), in kN	Proof Load (PL)), in kN	Min. Breaking Load (BL)), in kN	
12	Linkage plate		150	188	300	
13	TP Bridge fitting		210	263	420	
14	Buttress		Between tiers	650	715	850
			Top tier	250	275	325

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S - Types of Containers

No.	Technical information
S1	General Information
S2	Dry Cargo Containers
S3	Reefer Containers
S4	Tanktainers
S5	Flat Rack Containers
S6	Open Top Containers

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S1 - General Information

Containerization of cargo aids in the speedy load/discharge of cargo from ships as well as providing additional protection for the cargo from theft, breakage, and contamination. At the advent of containerization, there was no standard size container, and many were custom built for particular trades or products. With the birth of the container vessel the need for standard size containers became a priority in order to facilitate the interchangeability of containers between different carriers. The two standard sizes that became established were 20 ft. and 35 ft. The 35 ft. standard was promoted by Sealand because that was the largest over the road trailer allowed in the United States at the time.

Due to the pre-eminent position of Sealand in the container business it was able to make the 35 ft. standard container a major market factor. Most other carriers however adopted the 20 ft. and 40 ft. container as standard. As containerization gained popularity Sealand found it had to change its standard or face increasing costs in shifting containers aboard non-company vessels. Twenty foot and forty foot containers that are 8 ft. in height are the standard size today. However, no sooner was a standard established than shippers wanted special sizes to accommodate their prizes. Hence we have standard 8 ft. height containers and hi-cube 9'06" containers, with varying lengths, up to 56 ft. Although there is often discussion about changing the width of containers, primarily to accommodate metric sized Euro-pallets, such a change is unlikely due to the enormous cost of modifying vessel cells. Just as container sizes have adjusted to accommodate shipper needs, various specialized containers have been developed to accommodate various types of products. The following details some of the container types that have developed in the

last 20 years.



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S2 - Dry Cargo Containers



This is the standard general cargo hard top container that most people are familiar with. It can be utilized to ship a wide spectrum of goods. It can also be modified to ship neo-bulk commodities with the insertion of a bag type liner. Standard sizes are 20' (6m) and 40' (12m) containers, but some lines also have 48' (±14m) and 53' (±16m).

Height can be standard GP 8' (m) or HC 9.06' (m)

Type	Container Weight			Interior Measurement				Door Open	
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m³)	Width (m)	Height (m)
20 ft	24,000	2,370	21,630	5.898	2.352	2.394	33.20	2.343	2.280
40 ft	30,480	4,000	26,480	12.031	2.352	2.394	67.74	2.343	2.280

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S3 - Refrigerated Containers



Carriage of refrigerated and/ or frozen cargo, for which precise temperature control is necessary. Compressor can be built into the front of the container or slung underneath the frame. These are available in 20' (6m) and 40' (12m) lengths.

Type	Container Weight			Interior Measurement				Door Open	
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m ³)	Width (m)	Height (m)
20 ft	24,000	3,050	20,950	5.449	2.290	2.244	26.70	2.276	2.261
40 ft	30,480	4,520	25,960	11.690	2.250	2.247	57.10	2.280	2.205

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S4 - Tanktainers



Tanks protected by an I-Beam framework. Often used to carry small amounts of chemicals and other hazardous materials. New 20ft ISO Tank are the standard size tank container available. With tanks ranging in capacity from 17,000L to 26,000L.



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S5 - Flatrack Containers



Used to carry cargo that does not conform to the conventional dry cargo container due to size or configuration. Commonly used to carry machinery and large vehicles. For very large cargoes, the ends can be folded down to create a platform container.

Type	Container Weight			Interior Measurement			
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m ³)
20 ft	30,480	2,900	27,580	5.624	2.236	2.234	27.90
40 ft	34,000	5,870	28,130	11.786	2.236	1.968	51.90

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S6 - Open Top Containers



Allows the loading of the container through the top with a crane or through the rear doors. Particularly suitable for over height cargoes that require more protection than that provided by flat rack.

Type	Container Weight			Interior Measurement				Door Open	
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m³)	Width (m)	Height (m)
20 ft	24,000	2,580	21,240	5.629	2.212	2.311	32.00	2.330	2.263
40 ft	30,480	4,290	26,190	11.763	2.212	2.311	65.40	2.330	2.263

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U - Notes

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