acrow.
ENGINEERING & CONSTRUCTION

OPERATIONS
TRANSPORT & MANUAL HANDLING

STANDARD OPERATING PROCEDURES

Any safety provisions as directed by the appropriate governing agencies must be observed when using our products. The pictures in this document are snapshots of situations at different stages of assembly, and therefore are not complete images. For the purpose of safety, they should not be deemed as definitive.

The loads featured in this document, related to the parts of the product, are approximate.

The company reserves the right to introduce any modifications deemed necessary for the technical development of the product.

Release Notes

This page is intended to record all changes to this Standard Operating Procedure.

Changes or additions to this document will be itemised with a brief description and date when the amendments were made.

DOCUMENT NUMBER: SOP-OPS-0015-F

ISSUE	DATE	Amendment Description
F	11/24	UPDATED INFO & LAYOUT

Contents

1. INTRODUCTION

1. Introduction

Safety Recommendations

The purpose of this document is to provide guidelines for the safe storage, handling, maintenance and transport of Acrow Formwork and Scaffolding range of ACROW STILLAGES.

These documents also focus on explaining the Types and specifications of these stillages.

ACROW STILLAGES are used to palletize scaffold components such as Standards, Transoms, ledgers and braces for storage and transport purposes. They are typically manufactured from CHS tube (Ø48.3 x 4mmmm) or combination CHS and RHS (76x38x4mm). The stillages are either painted or hot dip galvanized. The shaped stillage feet enable stillages to be stacked on top of each other within stack height limitations.

This information is for general guidelines.

This document is NOT a substitute for site-specific Safe Operation Procedures or government requirements. It is the Installation Contractors responsibility to prepare safe work method statement and observe and comply with site specific health and safety regulations, standards and policies.

The information in this document might change without notice. Acrow Formwork & Scaffolding is always committed to continuous product development and improvement. Please contact our National Engineering Department for any further information and for possible updates.

Reference should be made to the Solutions Technical Guides for further information regarding the stacking and transport of individual components.

Safety is everybody's responsibilities. Acrow Scaffolding and Formwork maintain a stringent Health and Safety standard to ensure its products and services meets the defined health and safety regulations and to ensure safe operation of their employees, contractors and customers.

Please ensure adhering to in-house and site safety procedure prior to conduct any activities involving loading, unloading, transport and handling of stillages including but not limited to:

- Wearing a proper Personal Protection Equipment's
- Conduct visual inspection of stillages at every step of the operation
- Ensure all components are fully secured prior to handling, storage and transport
- Follow stacking and handling procedures

1. Introduction

Required Personal Protection Equipment

Ensure the individual is wearing the required Personal Protection Equipment as specified by Acrow's yard and the construction site safety procedures, including:

- Safety Boots
- Safety Glasses
- Safety Hard Hat – head protection
- Ensuring to adhere to safe work procedure issued by Acrow and the construction site
- Protective Clothing

Visual Inspection

Visually inspect is a procedure aiming to ensure stillages are defect free, fit for operation, fit for lifting (forklift and crane handling) and that their stacking or load carrying ability isn't adversely affected.

The extent of Visual inspection is explored in detail in the Dispatch and Good Inwards Process Flow, however, below are common sings of defects that can occur during transport and handling, site use and or due to wear and tear.

1. Bent horizontal members of the stillage.

2. Bent vertical leg/post of the stillage.

3. Cracked or corroded welds.

4. Damaged and distorted Foot Plate.

1. Introduction

5. Collapsed or missing foot plate.

6. Deep rust, corrosion and pitting.

7. Build up of concrete.

2. RESPONSIBILITIES

2. Responsibilities

Acrow Team's Responsibilities

Observe Acrow's safety guidelines, procedure and instructions, ensuring the wellbeing of its employees, contractors and visitors while on Acrow's site, during the transporting of components and at construction site (if Acrow is involved in installations)

- Supervise the loading and unloading process.
- Supply only defect free components.
- Check and ensure stillages are defect free and fit for purpose prior to loading them with components. Inspect and maintain stillages as per the Inspection and Maintenance Process Flow (Refer to page 1.1 and 9.6).
- Check the quality of stillages and components after been returned to Acrow's premises. Assess and inspect any damaged stillages and components, maintain, repair or dispose if they are beyond repair, refer to Inspection and Maintenance section.
- Follow stacking of stillages guidelines, at the Acrow's yard and onto the truck.
- Fully secure "strap" components into stillages prior to upload stillages into truck.
- Proper handling of stillages by mean of forklift by a trained and certified forklift employee.
- Ensure equipment such as forklift and truck are fully maintained, has valid road worthy certificate and safe to use.
- Coordinate transport activities, liaise with the transport contractors and work site representatives.
- Document each individual stillage load including components list and total weight.
- Ensure stillages are fully secured into the truck prior the truck leaving Acrow's premises.

When loading (and unloading) the vehicle make sure:

- The load is stabilised. Take steps to stabilise a load that is at risk of toppling over.
- Understand and use safe work practices when loading and unloading the vehicle. Create plans, train staff, create loading zones and communicate appropriately for the environment.
- Using enough restraint to keep employees and others safe. The load restraint system must meet the Performance Standard defined in the National Transport Commission, NTC Australia, Load Restraint Guide 2018.

Transport Contractor's Responsibilities

- Observe Acrow's safety guidelines and procedure. Follow Acrow's Yard manager instructions.
- Observe construction site's specific safety procedure and instructions. Make sure the transport team understands and is familiar with loading and unloading in accordance with according the construction site's role and be familiar with the exclusion zones.
- Attend site safety induction and be familiar with the site safety requirements.
- Coordinate transport activities between Acrow's and Site management.
- Safe transport of component from and to Acrow's premises.

Planning the load:

- Understand the load. Know the load's characteristics.
- Choose a suitable vehicle for the load type and size. Check the vehicle's carrying capacity and allowable overhang/height.
- Use a restraint system that is suitable for the load. Choose the most suitable restraint method for the load and vehicle.
- Position the load to maintain vehicle stability, steering and braking. Keep the center of gravity as low as possible; don't exceed legal limits for overhang, height and width, mass and axle mass.
- Check the vehicle structures and restraint equipment are in good working condition and strong enough to restrain the load. Check all vehicle and restraint equipment is rated and fully functioning, and all worn/damaged equipment is repaired or replaced.

Safe transport of Acrow's components. Driving according to the load and driving conditions

- Allow for changes in vehicle stability, steering and braking when driving a loaded vehicle.
- Be aware of the changes in the vehicle's handling, height and width.
- Check the load and its restraint regularly during the journey. Loads can settle and shift; lashings may need to be re-tensioned.

2. Responsibilities

Transport Contractor's Responsibilities Cont.

- Drive at an appropriate speed for the driving conditions.
- Safe uploading and loading of stillages at the construction site.
- Loading and unloading at the nominated site loading zone.
- Use appropriate loading and load restraint equipment. Apply the right restraint methods.
- Check load for movement or stability before removing restraints and unloading and use appropriate equipment for unloading.

Installation Contractor's Responsibilities

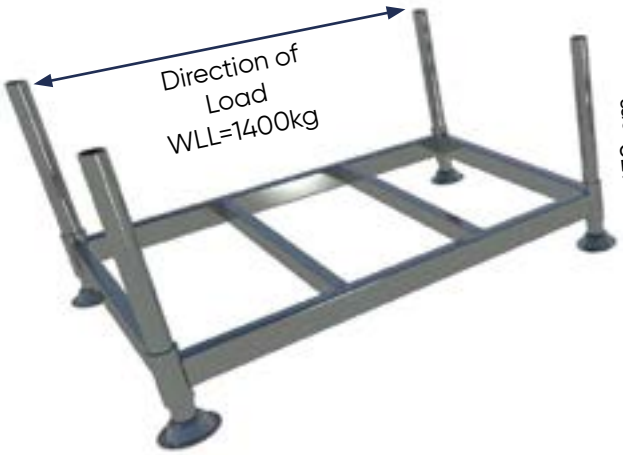
- Appoint a competent person to plan for safe loading / unloading and delivery of loads.
- Prepare safe working method for the installation, assembly and dismantle of Acrow scaffolding.
- When applicable, use forklift for unloading stillages. (Refer to page 6.2).
- Ensure safe crane handling of stillages by a qualified rigger.
- Check that stillages are defect free on the truck and all components are fully secured prior to commencing of unloading of stillages on-site.
- Provide crane and any other equipment required for unloading stillages at construction site including chains.
- Document an appropriate loading and unloading procedure and exclusive zone. Communicate and share such documents to Acrow and the transport contractor.
- Coordinate site safety induction and provide necessary training and documentation to enable the transport and installation team to safely unload the stillages at the work site.
- Assess the requirements for vehicle access and provide safe means of access.
- Clearly define the loading and unloading zone and the load exclusive zone.
- Make suitable monitoring arrangements to ensure that proper load planning occurs, and safe system of work and procedures are always followed.
- Ensure that drivers follow the driving instruction.

3. STILLAGES & WORKING LOAD LIMITS

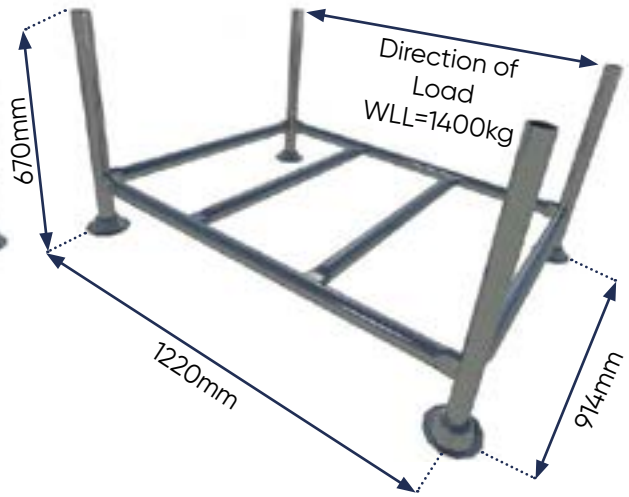
3. Stillages & Working Load Limits

Stillage Sizes

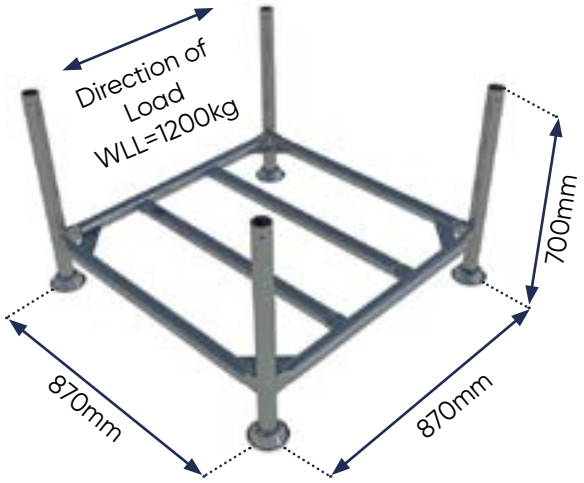
- Acrow Stillages are manufactured in two different sizes with a similar load rating when components are loaded perpendicular to the bottom of the horizontal members "longitudinal direction" and the load is equally distributed over the four horizontal tubes. (Refer to Stillage loading)
- 1200x900 Stillage: The Working Load Limit "WLL" = 1400kg when loaded in the longitudinal direction.
- The WLL will be reduced to 1000kg if components will be loaded in the transverse direction. This direction of loading is not recommended and should be avoided.
- They are typically manufactured from CHS tube (Ø48.3 x 4mm) or combination CHS and RHS (76x38x4mm).
- 900x900 Stillage - CODE: MP: The Working Load Limit "WLL" = 1200kg when loaded in the longitudinal direction any direction. However, the requirement is always to load components in the longitudinal direction to maximize load.



1200x900 Acrow Stillage Type M2K



1200x900 Acrow Stillage Type SP



900x900 Acrow Stillage Type MP

3. Stillages & Working Load Limits

Storage of Empty Stillages

Empty stillages can be stacked on top of each other and diagonally (Inter-stack) to reduce stacking space and for storage purpose.

- Ensure these stiles are fully secured when they are stacked for storage.
- Do not transport stacked stillages on the truck.
- Every type and size is stacked and stored separately.

Incorrect way of stacking

Correct way of stacking

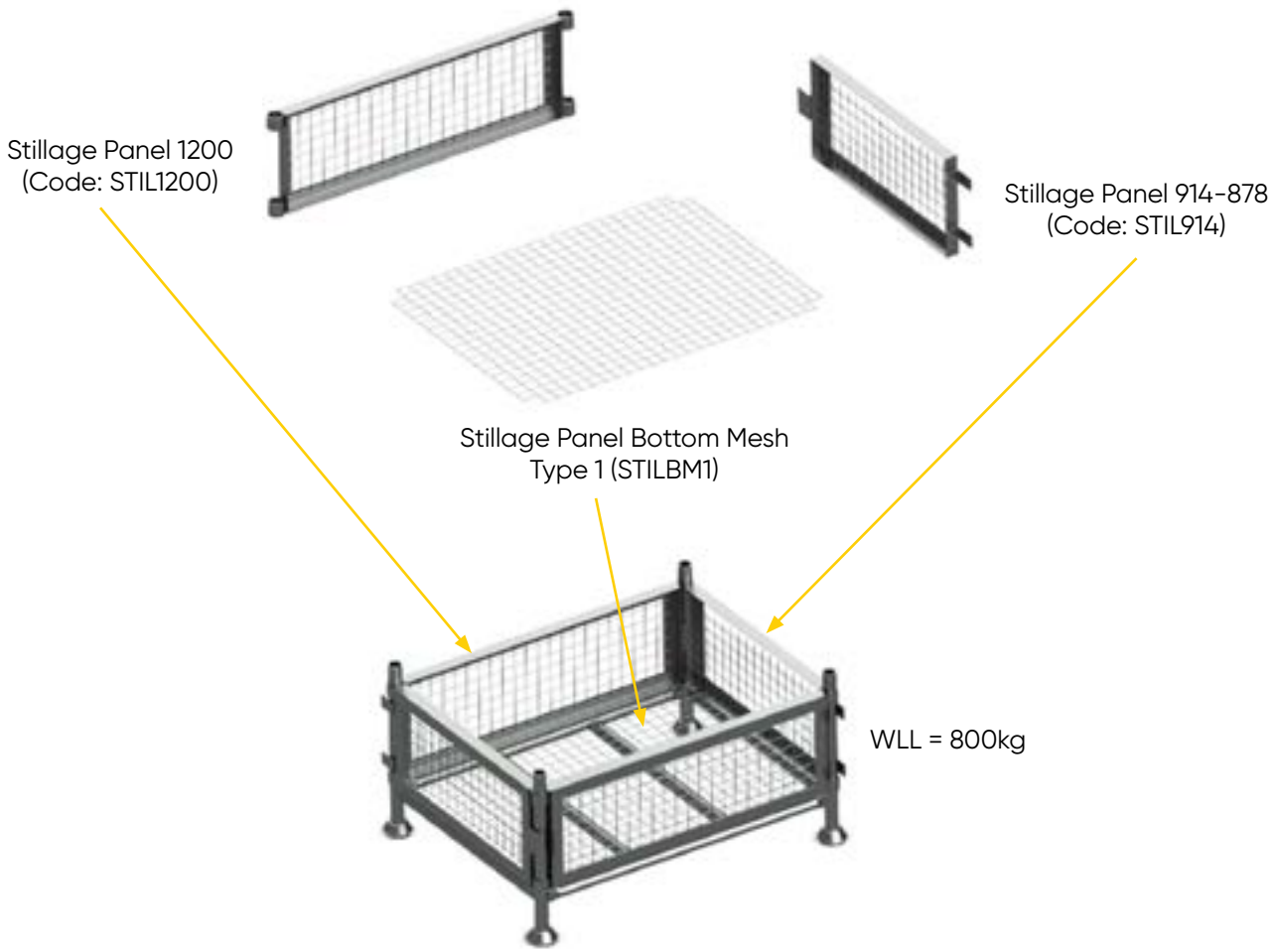
3. Stillages & Working Load Limits

Detachable Mesh Panels for 1200x900 and 900x900 Acrow Stillages

Modular detachable mesh sides (Panels) and bases are designed to be inserted into the 1200x900 Type SP and 900x900 Type MP stillages, converting these stillages into cage stillages.
The cage stillages are used for storing and transporting components that cannot be safely secured and transported using 900x900 or 1200x900 stillages.

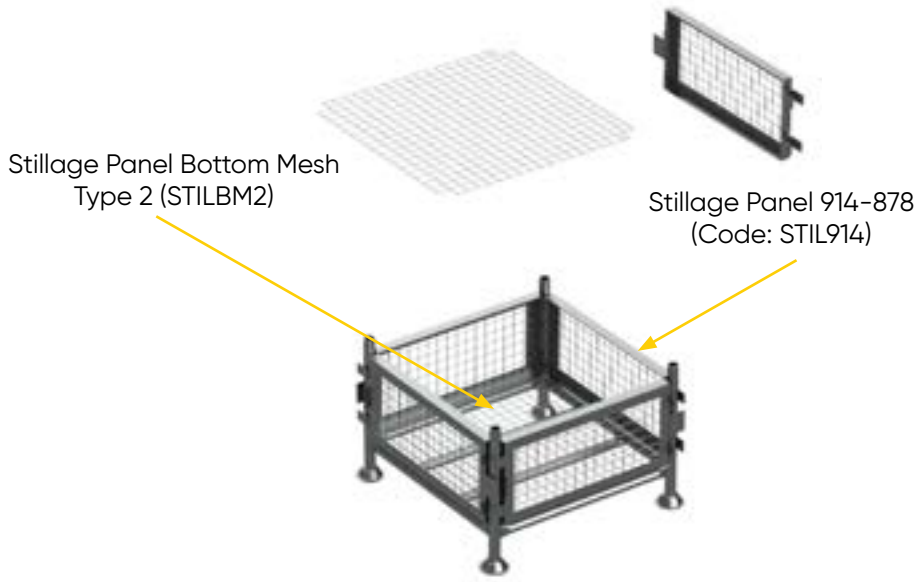
It is important to:

- Maintain the WLL (Working Load Limit) of these cage stillages at 800kg.
- Ensure that these stillages, side, and bottom mesh are defect-free.
- Do not over-pack the cage stillages. Components must be stored below the top surface of the mesh enclosure.
- Wrap the top of these stillages for further securing components in these cages. Uncovered or unwrapped components are prone to bouncing during a trip.



Converting 1200x900 Stillage into Cage Stillage using Detachable Mesh Panels

3. Stillages & Working Load Limits

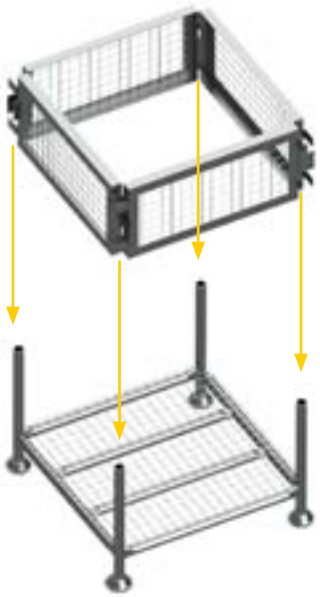


Assembling the cage stillage involves two stages:
Stage 1: Position the bottom mesh above the horizontal tubes between the stillage posts.
Additionally, use four 4.6mm stainless steel cable ties to secure the bottom mesh to the outer horizontal tubes.
Stage 2: Slide the four mesh panels onto the stillage posts.

Stage 1: Place the bottom mesh into its position and secure.

Secure bottom mesh to outer tubes using 4 x 4.6mm stainless steel cable ties

Stage 2: Slide the 4 mesh panels onto the stillage posts



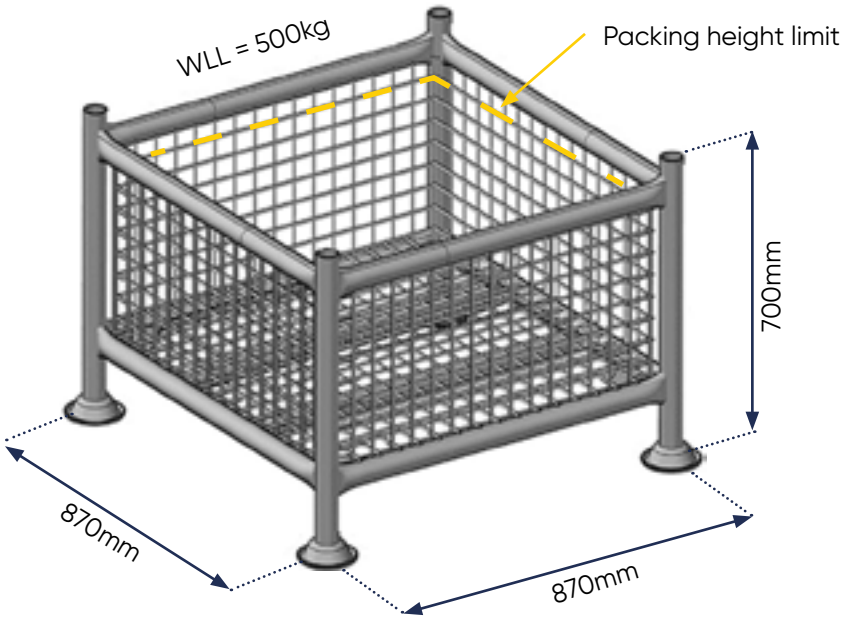
3. Stillages & Working Load Limits

Steel Cages Stillages

Steel cage stillages required to be used to store and transport components that cannot be safely secured into the 900x900 or the 1200x900 stillages. These steel cages shall be used to transport loose items such couplers.

It is important to:

- Maintain the WLL of these cage stillages of 500kg.
- Ensure these stillages are defect free.
- Do not over-pack the cage stillages. Components must be stored below the bottom of the top horizontal tubes.
- Cover and wrap the top of these stillages prior to strapping to further secure components into these cages. Uncovered or unwrapped components are prone to bounce during the trip.
- Only use cage stillage that have bottom and top horizontal tubes welded to the vertical posts.
- This is essential requirement when lifting these stillages using chain. The chain will rest on the horizontal tubes of these stillages rather than on the mesh itself.
- Ensure stillages adequately restrict the upward movement of items they contain to prevent them from dislodging.

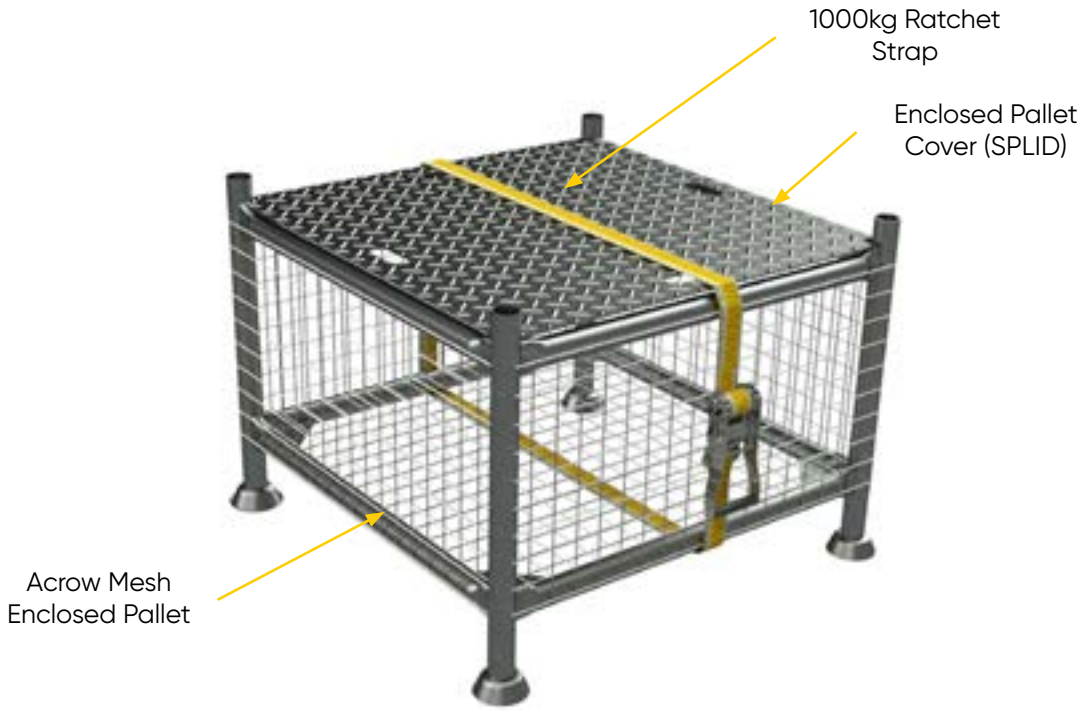


3. Stillages & Working Load Limits

Enclosed Pallet Cover

The enclosed pallet cover is used in conjunction with an Acrow Mesh Enclosed Pallet to keep goods contained within during transport to/ from and around site. The enclosed pallet cover must:

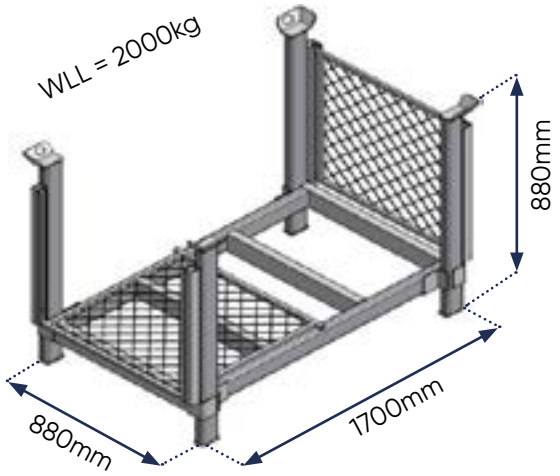
- Sit inside all 4 legs of the stillage to prevent sliding.
- The cover must sit flat on all 4 horizontal top members and be in contact with all sides
- The cover is to be secured with a 1000kg ratchet strap over the top and fully around the Mesh Enclosed Pallet as per the image below. Place strap central over cover. Ensure strap is in good working condition.
- Items are not to be placed or transported on top of the cover.
- Mesh enclosed pallet Working Load Limit must not be exceeded.



3. Stillages & Working Load Limits

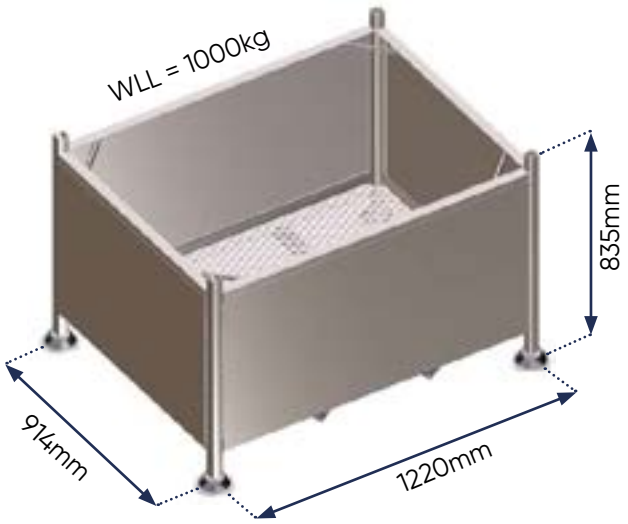
Collapsible Stillages

A steel cage stillages. Its sides can be removed for ease stacking and transporting when empty. The Working Load Limit "WLL" = 2000kg



SPEGAL Enclosed Stillage

The Spegal Enclosed Stillages are used to store and transport components with length not exceeding 500mm, as these components cannot be safely secured into the 900x900 or the 1200x900 stillages. The Working Load Limit "WLL" = 1000kg.



3. Stillages & Working Load Limits

Polyethylene Bags

Polyethylene bags are costume designed to be used with Acrow's 1200x900 steel stillages.

- These bags must only be used and handled with Acrow's 1200x900 steel stillages.
- Working Load Limit for these bags when installed in Acrow's stillage = 200kg.
- Some of these bags are designed for a single trip only. Always check the condition of these bags before re-use.
- The polyethylene bags will degrade when expose to UV light. Do not use them to store components in open and uncovered yard.
- These bags are not suited for storage and transport components having sharp edges.
- The pre-fitted cover must be used to cover components and the bag before any strapping and transport.

WLL = 200kg

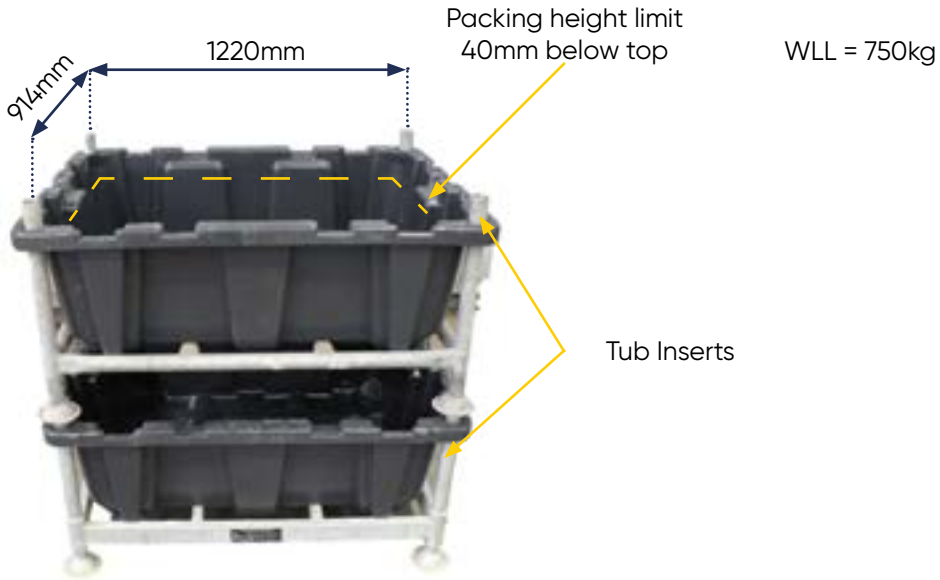
3. Stillages & Working Load Limits

Plastic Tubs (For Acrow Yard Use Only)

Plastic tubs can be only used for storage of small components at Acrow site.

Plastic tubs are totally banned for all types of transport of components. These plastic tubs tend to crack while strapping them into the stillage or onto the transport vehicle.

- These tubs must only be used when installed in an Acrow's 1200x900 steel stillage.
- Working Load Limit for these tubs when installed in Acrow's stillage = 750kg.
- These tubs have no lifting points and must not be lifted in & out of the stillage when loaded.
- Do not move if tubs are not correctly inserted & seated into the stillage.
- Steel stillage must not be damaged or have bent legs. The Plastic Tubs will not fit into damaged stillage.
- Stillage plastic (tub) inserts must be used with Acrow stillage.
- Components to be stored in the tubs must be packed by lowering it into tubs and not by throwing from height or distance. Throwing components into the stillage will damage the tub.
- Do not over-pack the tubs. Components, when stored in the tubs must be at least 40mm lower than the rim of the tub.



- Do not use if tub is cracked or damaged.
- Do not use for storing liquids or chemical of any kind.
- Destroy and discard any damaged plastic tubs.

4. STILLAGE LOADING AND STRAPPING PROCESS

4. Stillage Loading and Strapping Process

Stillage Loading and Strapping Process

It is a safety requirement that all components are fully secured and strapped on the stillages prior to any handling, storage, loading and unloading and transport of stillages.

It is also essential considering the loading process to ensure the balance of stillages, maximise load within Working Load Limit "WLL" and the ease the process of unloading reflecting installation sequences.

Stillage Loading

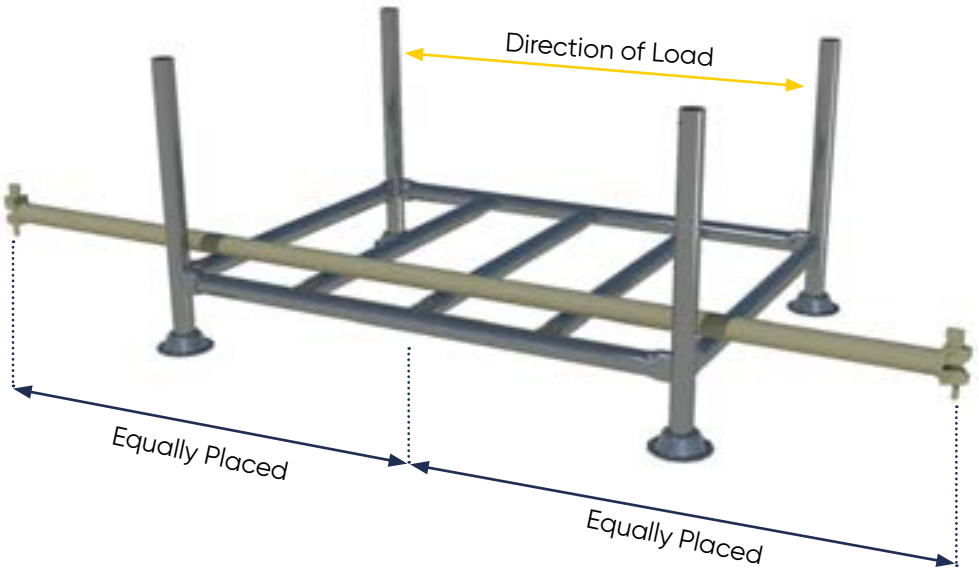
The loading process starts with selecting the right stillage size and type. Few factors must be considered in selecting stillage size and type:

- Type and size of components that will be loaded.
- Direction of loads.
- Stillage capacity. Maintaining the designated "WLL" - Stillage Palletization Chart.
- Load height.
- Levelling of load.
- Maintaining safe loading height.
- Marinating an even number of components: Optimization for stock control and enhancing productivity.
- Strapping method.

Component Types and Sizes and Direction of Loads

Components longer than 1200mm: Ensure:

1. Using 1200x900 ACROW Stillage.
2. Stacking and Loading of components perpendicular to the central cross members "bottom of the horizontal members", ie placed in longitudinal direction". This will ensure optimum loading capacity of stillages within the Working Load Limit "WLL" of 1400kg.
3. Centrally placed components to maintain balance during handling and transporting.



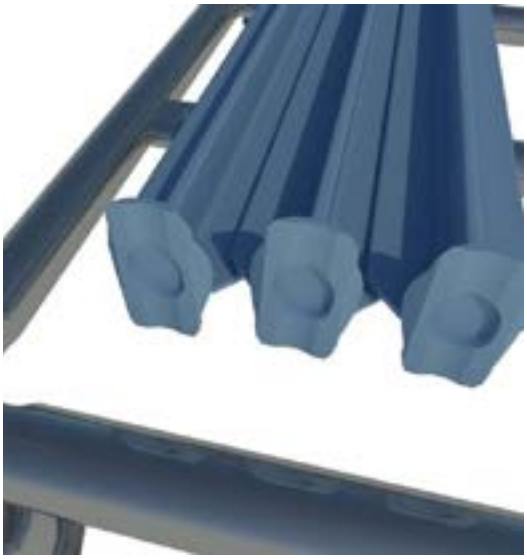
4. Stillage Loading and Strapping Process

Component Types and Sizes and Direction of Loads

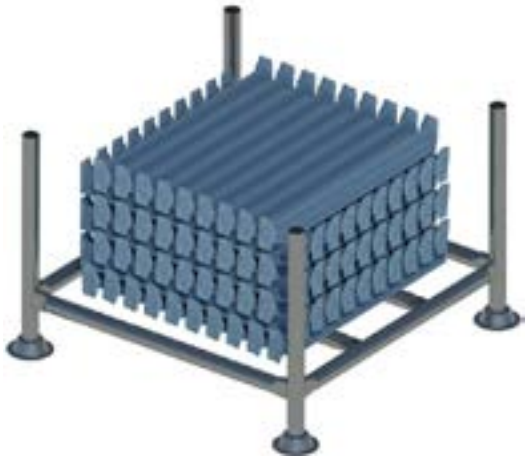
Components shorter than 900mm long

1. Both 900x900 and 1200x900 ACROW ST STILLAGES can be used. The 1200x900 stillage will have more capacity; two bundles of short components can be loading into one a 1200x900 stillage.
2. Load components perpendicular to the bottom of the horizontal members. The bottom raw components should rest on at least two horizontal members.
3. Overlap components when possible to better hold down group of components onto the stillage and to increase stillage loading capacity.
4. Lay-down the second raw in opposite direction (Cross stacking).
5. Continue with the process until reaching the designated number of rows and number of components insuring not exceeding the WLL.
6. Secure components independently form the stillage using at least two straps (Refer to page 4.8).
7. Secure components into stillage using at least two straps.

The bottom raw components should rest on at least 2 horizontal members.



Overlap components when possible to better hold down group of components and to increase stillage loading capacity.



Lay down the second raw in the opposite direction. Continue with process until you have reached the number of rows and components required.

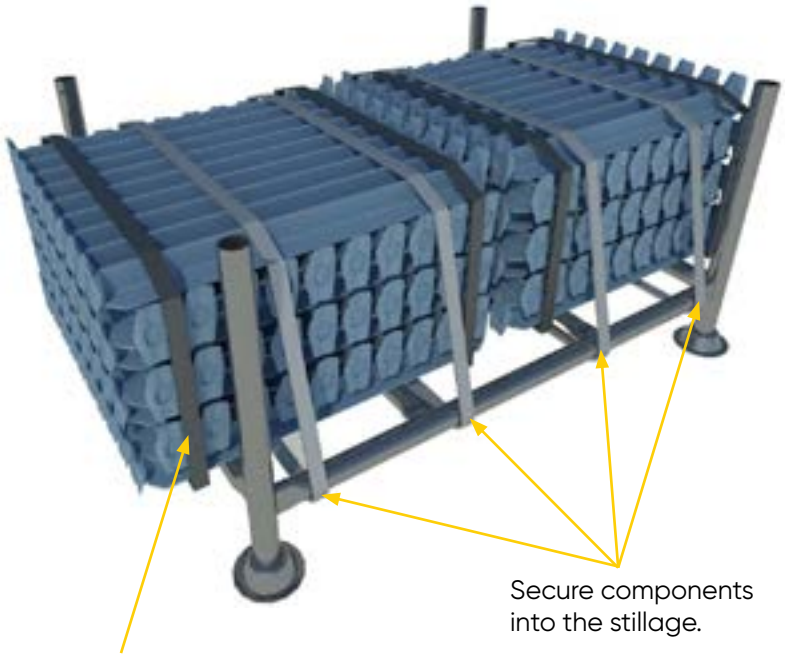
Secure components independently from stillage using at least 2 straps.

4. Stillage Loading and Strapping Process

Component Types and Sizes and Direction of Loads

When loading two bundles into the stillage, follow the same previous steps and ensure:

1. Each bundle is resting on at least two horizontal bottom tube members.
2. Each of the two bundles are strapped independently using a minimum of two straps (Refer to page 4.8).
3. Secure each bundle into stillage using at least two straps per bundle of components.



4. Stillage Loading and Strapping Process

Leveling of Load

Un-levelled load combined with improper strapping can lead to components sliding and fall over the stillage. This safety hazard is common with ACROW Props and other similar components having thickened ends such as plates.

To level the load horizontally use suitable stacking/ separator/dunnage hardwood rectangular timber (50x100 recommended).

Maintaining Safe Load Height

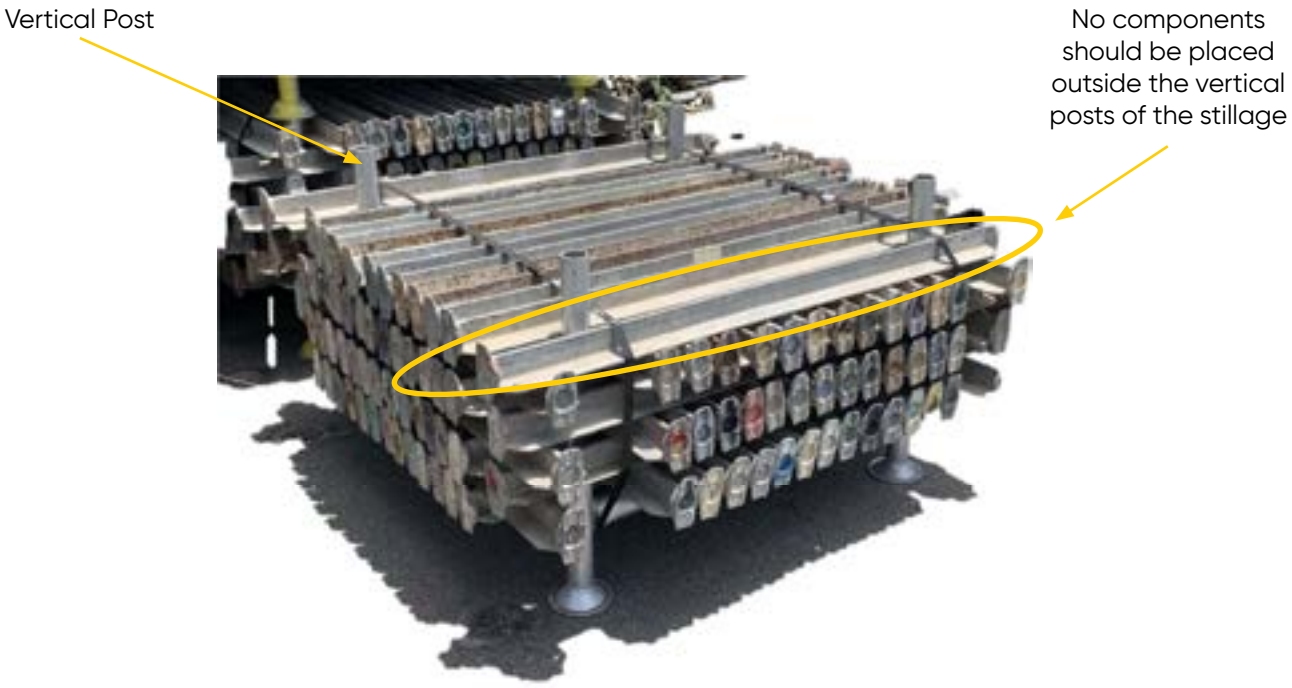
Loads of components should always be below the top of the four posts. Stacking above that level:

1. Is a risk hazards, may result in roll-over of components especially after removing the straps.
2. Will prevent multi stacking of stillages, thus reducing stacking efficiency and yard/site utilization.
3. May damage the components by the forklift's tynes during loading and unloading.

4. Stillage Loading and Strapping Process

Maintaining Loads Within The Stillage

Loads of components should be between the vertical posts. Placing components outside the post is a risk hazards can result in falling of components if the strap is removed or get damaged.



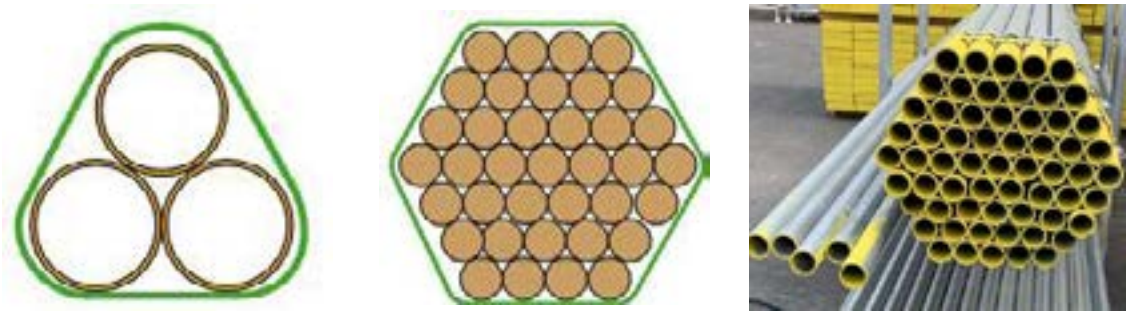
Unitise Packs of Circular Components (Self Supporting Shapes)

Forces during transport can change bundled components shape, especially circular bundles. The pre-packed bundles may settle, and components will become loose.

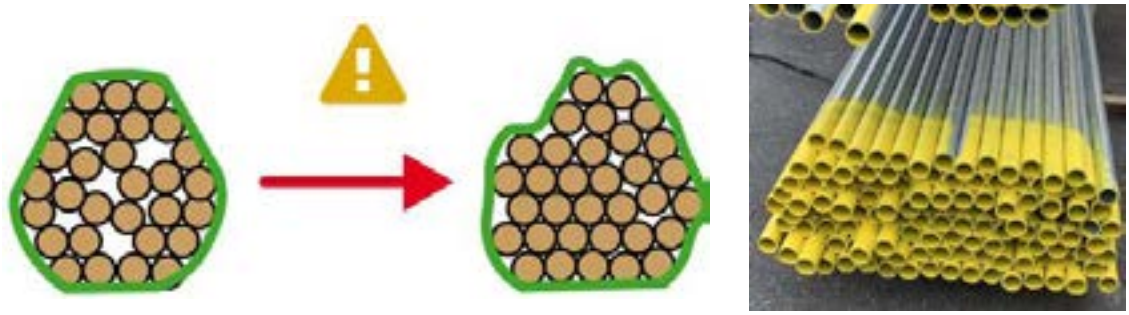
Combine packs of circular components in self-supporting shapes such as triangular or hexagonal pack. Such packing shapes will ensure all components are adequately secured and intact during loading, unloading and transport.

4. Stillage Loading and Strapping Process

Unitise Packs of Circular Components (Self Supporting Shapes)

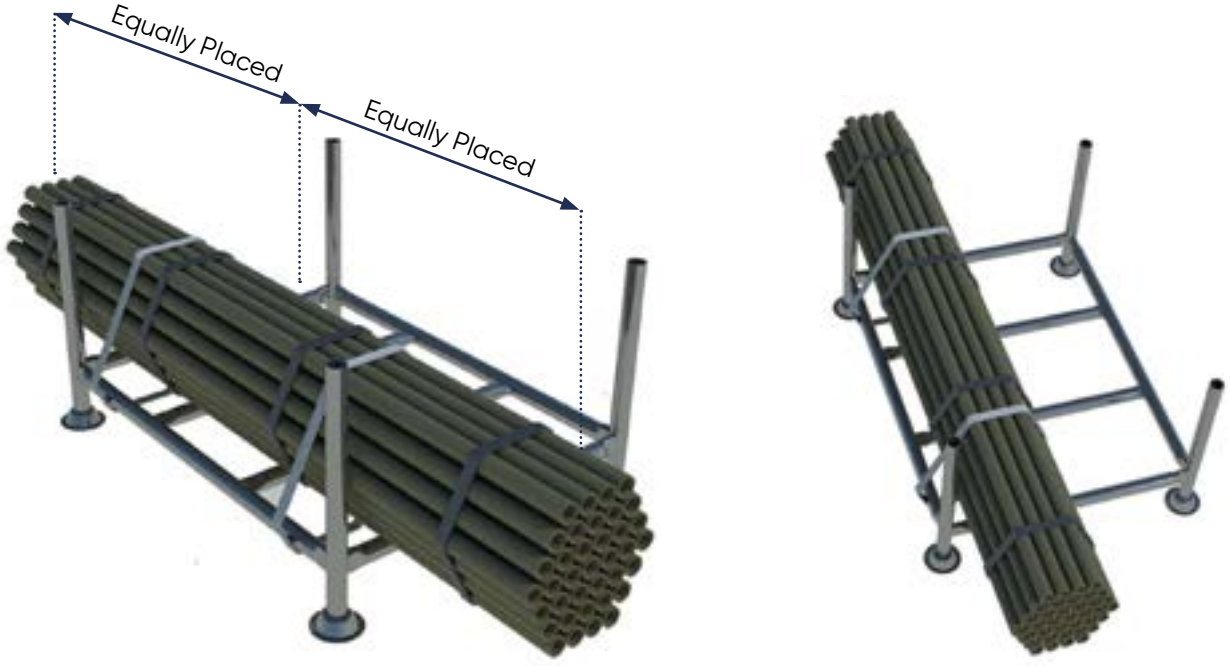


Example of unites packs of circular items.



Forces can change bundled components shape; components will become loose.

Components will be required to be independently strapped and centrally placed within the stillage to maintain balance during transporting and lifting. It is recommended to place such self-supported bundles on either side of the posts and secured them into the stillage horizontal tubes.



4. Stillage Loading and Strapping Process

Maintaining A Constant And Even Number of Components

Maintain an even number of components and fixed number of rows of components per stillage is an optimisation practice; it will assist in stock control and will enhance productivity.

Stillage Palletization Chart will facilitate maintaining constant a number of components and will ensure observing the stillage designated "WLL".

Row 7 = 13 Transoms

Row 5 = 13 Transoms

Row 3 = 13 Transoms

Row 1 = 13 Transoms

Total = 13 Transoms X 8 Rows = 104
(Note: 4 cross rows are not shown in image)

Strapping Location And Minimum Number Of Straps

It is recommended to have two levels of strapping of components into stillages to ensure safe storage, handling, and transport of stillages:

Strapping the components as a bundle independently from the stillage. Only required if strapping to stillages does not secure all the components

- Use minimum two straps, one in each end.
- When possible ensure strapping the bundles outside the stillage post/legs.

Strapping the components into the stillage

- Use minimum two straps.
- Place the straps closer to the stillage Leg/Post.

Secure components independently from the stillage. Only required if strapping to stillages does not secure all the components.

4. Stillage Loading and Strapping Process

Visual Check Of Strapping Process

Visual check of strapping is required to ensure all components are secured into the stillage. Below are some of visual check activities and signs of inadequate strapping:

- Partial strapping. Few components have been partially secured using only one strap.

- Components are not secured and strapped into the stillage.

- Loose straps.

- Components are not fully secured and can slide away from the stillage. Simply check if you can pull any of the post-strapped components.

- Insufficient strapping and imbalanced load can lead to components sliding out in one direction. This will increase tension on straps.

- Insufficient strapping and components stacked on to timber pallets without plastic wrapping.

4. Stillage Loading and Strapping Process

Storage And Transport Of Long And Bulky Components

Long Acrow's components, such as GASS props, can be stored using timber dunnage.

Storage in Yards
The following should be maintained to ensure stacks stability:

- Stack components in rows (layers) separated by at least two 75x50mm dunnage's.
- Equal number of components shall be used in each row (layer).
- Secure the components as a bundle using at least two steel straps.
- Caution to be taken when cutting straps. Only cut straps when pack in on ground level.

Transport
Stillages must be used to transport GASS props. The following should be maintained:

- Bundle to be secured using at least two steel straps on ends.
- Bundle to be secured to stillage using at least two steel straps.
- These may be transported 3 high if transport straps are placed over the second and third stillages.

5. PLASTIC WRAPPING OF STILLAGES AND TIMBER PALLETS

5. Plastic Wrapping of Stillages and Timber Pallets

The Need For Plastic Wraps Of Stillages

Stillage wrapping is required if the components:

- At a risk of sliding, spearing or separation.
- Are not fully resting on the outer tubes of the stillage. This is common for stillages containing components shorter than 900mm.
- As extra measure to secure component during transport and if back board is not fitted into the truck.
- When timber pallet is used.

Wrapping Guideline - Including Timber Pallets

To increase the effectiveness of wrapping:
- Wrap the entire parameter of the stillages at least three times.
- Cross wrap the top three times diagonally in both directions.

Please observe the following:

- Wrap stillages or the timber pallets before loading them into the transport vehicle.
- Wrapping is not a substitute for strapping. All components should be strapped into stillage prior to commencing wrapping.
- Plastic wrap should not be used as a restrain of components during transport.
- Wrapping is not a replacement for cage type stillage.
- Partial wrapping is not acceptable.
- Always check and observe if components are strapped before removing the plastic wraps. Components may fall during removing of wrap if they are not strapped into stillage.

5. Plastic Wrapping of Stillages and Timber Pallets

The Need For Plastic Wraps Of Stillages

- It is good practice to wrap stillage before stacking. However, wrapping is not a substitute for strapping. All components should be strapped into stillage prior to commencing wrapping.

- Components are not strapped into stillage.
- Wrap should not be used as a means to restrain components. An example, jacks are not strapped into stillage but only wrapped.

- Always check and observe if components are strapped before removing the plastic wraps.
- Partial wrapping is not acceptable.

- Wraps can prevent sliding (spearing) of cylinder components.

- Plastic wraps can prevent sliding (spearing) of components stacked on timber pallet.

5. Plastic Wrapping of Stillages and Timber Pallets

Wrapping And Strapping Of Timber Pallets

Some of Acrow's components can only be transported using timber pallets. The following should be observed when using timber pallets for stacking and transport of Acrow's components:

- Ensure the timber pallets are free from any defects, has no dislodged parts or exposed nails.
- Check the working load limits of the timber pallet, never overload these pallets.
- Consider the best way to stack and strap components to maintain a stable, levelled and free from twist load.
- Components must be strapped independently from the timber pallet first.
- Use at least two straps to secure the components into the timber plate, a total of four straps per pallet, two in each direction.
- Avoid running the straps under the base of the pallet where they can be trimmed by the forklift's tynes.
- Plastic wrap the pallet and components after completing the strapping process. The wrap should cover both the timber pallet and the components.

Consider the best way to stack components to maintain stability.

Avoid running the straps under the base of the pallet where they can be trimmed by forklift tynes.

Use at least 4 straps, two in each direction.

5. Plastic Wrapping of Stillages and Timber Pallets

Wrapping And Strapping Of Timber Pallets

The wrap should cover both the timber pallet and the components.

Plastic wrap the pallet and components after completion.

6. STILLAGES STACKING PROCESS: SPECS AND LIMITS

6. Stillages Stacking Process: Specs and Limits

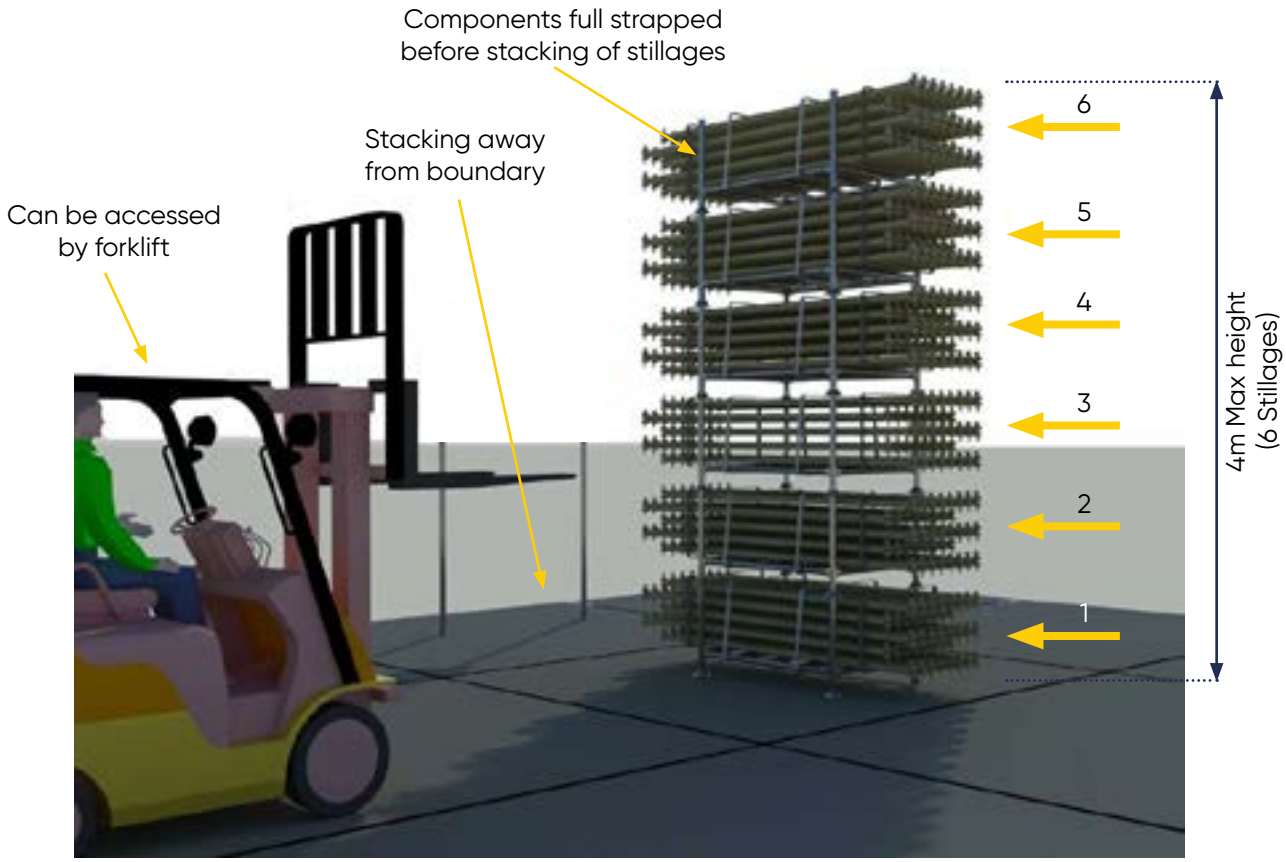
Stacking Stillages At Acrow's Yards

Acrow's stillages are designed so that it can be stacked up to a maximum height of 6 stillages, subject to:

- Maximum total load of 6000Kg per row of stillage and the load is evenly distributed in every stillage.
- Stillages are to be placed on sound and firm foundation which should not be subject to settlement, water run off and puddling (Refer to page 6.3).
- Nominal service wind not exceeding 65Kph.
- The stillages are damage and defect free (refer to page 1.1).
- Stillages are aligned vertically, the four-stillage foot plates are resting on the Centre of the four posts of the stillage underneath.

It is important to consider the following while stacking stillages:

- Components are fully restrained on the stillage prior to stacking.
- Ensure all components are fully strapped and secured into stillage prior to stacking.
- Wrap stillages if required.
- Label product and print quantities for future reference and stock take.
- Stillages can be accessed by forklift after stacking.
- Stillages stacked away from neighbour boundary (Refer to page 6.4).



6. Stillages Stacking Process: Specs and Limits

Foundation Type & Stacking Height

Stillages must be placed on sound and firm foundation and such foundation should not be subject to settlement, water runoff and puddling. Sole plates (soleboards) must be used on foundations other than concrete.
The table below demonstrates the maximum static stacking height based on foundation type.

Scaffold Stillage Load	Foundation Type		
	Concrete	Asphalt[2]	Soleboard Type A3
1000kg	6 High	6 High	6 High
1200kg	5 High	5 High	5 High
1400kg	5 High	5 High	5 High

- Well compacted ground with minimum 300 kPa bearing capacity.
- Soleboards are required under Stillage feet.
- Soleboard Type A: 500 x 225 x 35mm Oregon (or similar) minimum 500 long, stillage leg placed centrally in the middle.
- Sole boards are not required on reinforced concrete.

Wind Loads And Stacking Height

The stillages stacking height is subject to wind speed and per table below.

Scaffold Stillage Load	Site Max Wind Speeds			
	0 - 65Km/h	90Km/h	120Km/h	150Km/h
1000kg	6 High	5 High	3 High	2 High
1200kg	5 High	5 High	3 High	2 High
1400kg	5 High	5 High	3 High	2 High

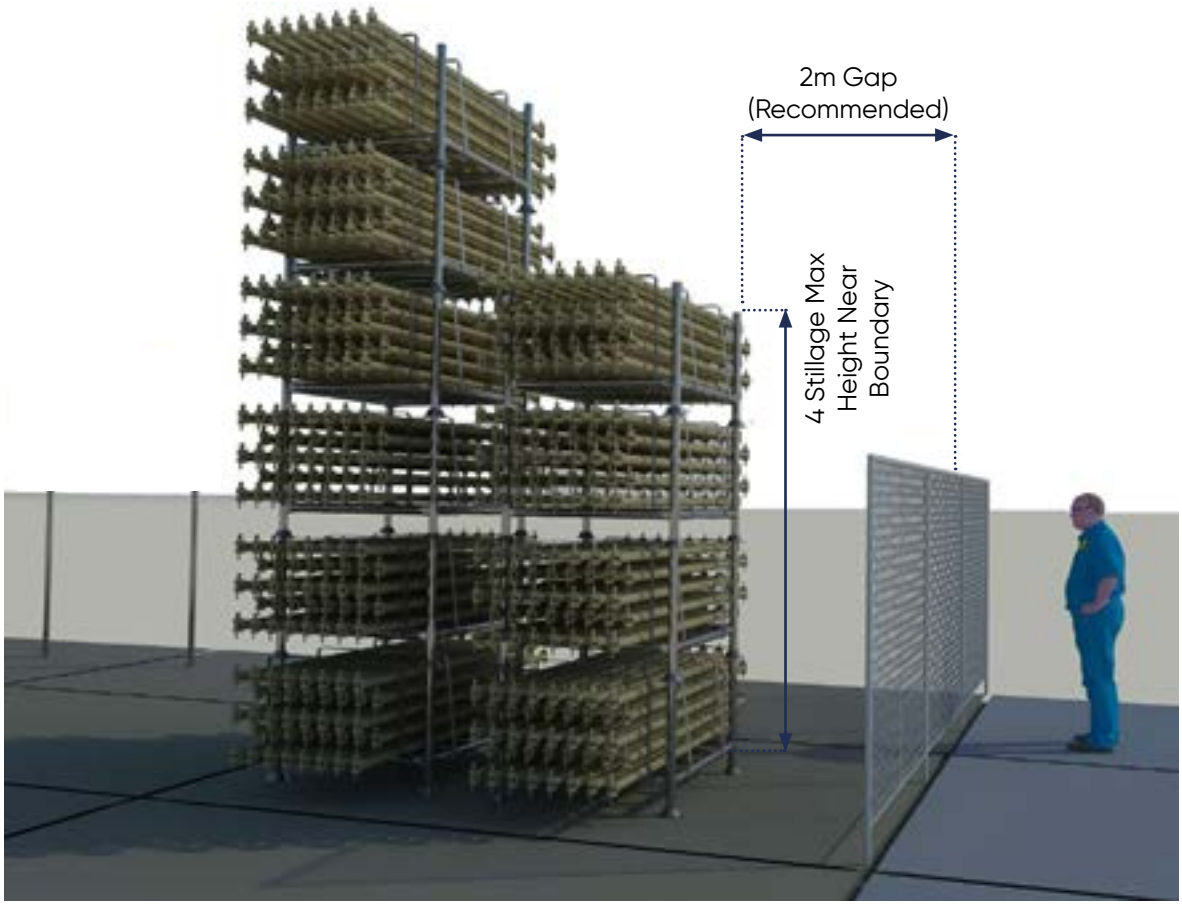
Notes:
- Maximum projected area of packed equipment to wind for each stillage = 3.0m long x 0.5m high.
- Stillages are not on road transport.

6. Stillages Stacking Process: Specs and Limits

Stacking Near Acrow Yard Boundary

In the unlikely event of stacked stillages collapsing, and to prevent possible damages to public properties and personals, restrict maximum stacking of stillages to max of 4 levels high.

It is recommended to leave enough gap (2 meters) between the fence and the first row of stillages for the same above reason and to prevent possible damages to the fence by the forklift's tynes during loading and unloading.

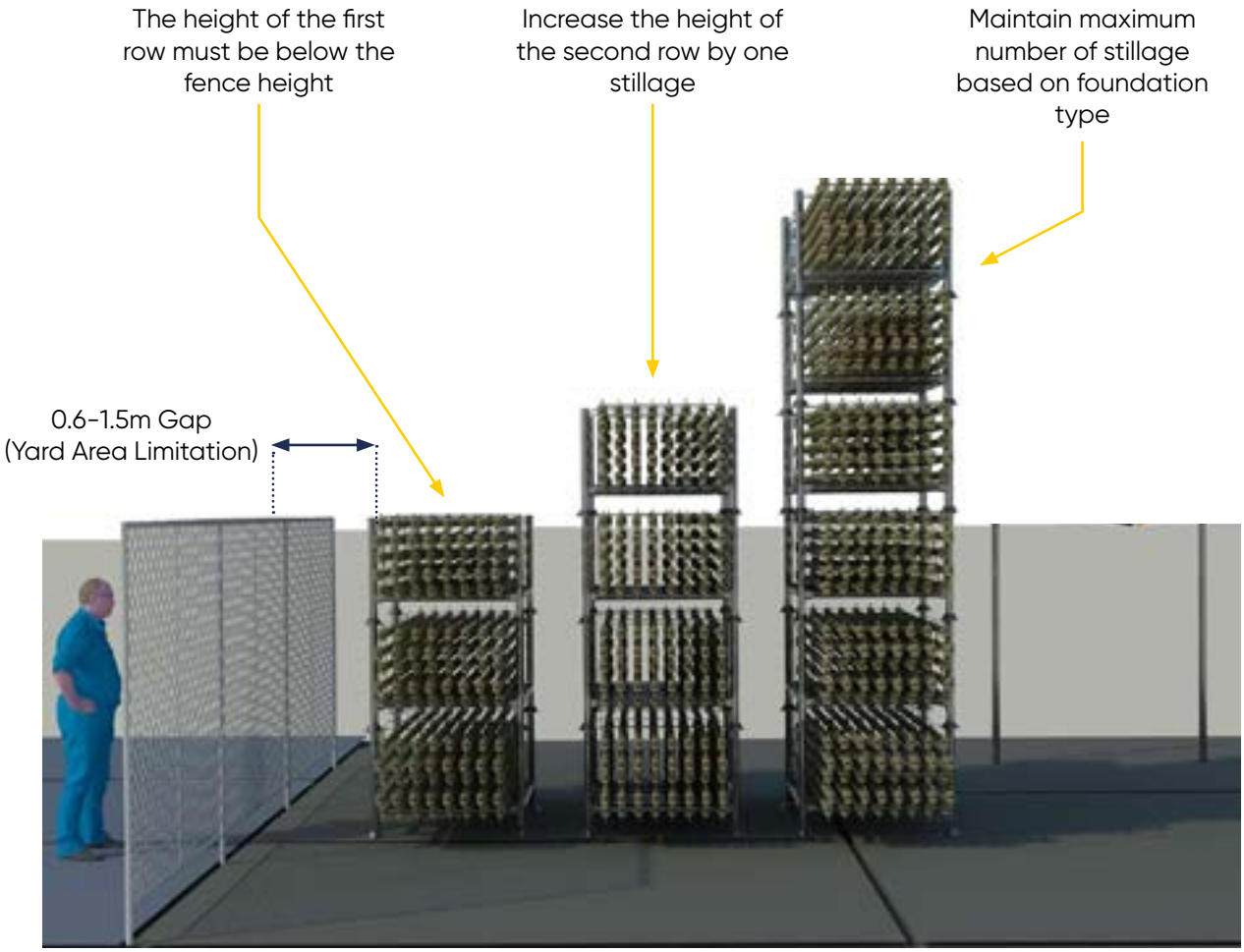


6. Stillages Stacking Process: Specs and Limits

Stacking Near Acrow Yard Boundary

Yard stacking area limitation may impose stacking the stillages closer to the boundary, up to 1.0 m. In such circumstances, please insure:

1. The height of the first row of stillage is to be kept below the fence height. Limit the total number of stacked stillage near the fence to maximum of 3 stillages (depending on the fence height).
2. Keep the height of the next row to 4 stillage. Increase the number of stillages by one.
3. Stack the following rows up to 6 stillages, based on foundation type.



6. Stillages Stacking Process: Specs and Limits

Good Practices Of Stacking Stillages

1. Components are fully strapped as a bundle independently from the stillage and strapped and tight into the stillage.
2. Maximum height of 6 stillages or limited by the foundation type and wind speed.
3. Posts are aligned and centered.
4. One type of component per stillage per rack of stillages.
5. Labeling of components: listing the component's type and their quantities per stillage.

6. Stillages Stacking Process: Specs and Limits

Examples Of Improper, Unsafe And Unacceptable Stillages Stacking

- Using damaged stillages (bend posts), reduce the yard stacking capacity. Risk of stillage collapsing


- Signs of unstable stillage packing


- Offset stacking, stillage legs are not aligned


6. Stillages Stacking Process: Specs and Limits

Examples Of Improper, Unsafe And Unacceptable Stillages Stacking

- Damaged stillage foot plates. These stillages may collapse when laid flat on floor or truck

- Improper stacking. Stillage should be stacked on solid slab, not on top of each other

- Maxing of components, stacked above the post level and are cantilevered over the edge

6. Stillages Stacking Process: Specs and Limits

Examples Of Improper, Unsafe And Unacceptable Stillages Stacking

- Lack of straps and loads are not levelled


- Components are not strapped and secured prior to stacking of stillages


- Loads are scattered, not organised or secured onto stillage


6. Stillages Stacking Process: Specs and Limits

Examples Of Improper, Unsafe And Unacceptable Stillages Stacking

- Mixed loads, components are not secured using straps, instead wrapping is used.
- Using damaged plastic tubs.
- Unsuitable use of Polyethylene bags.

- Stacking more than 6 stillages

7. LOADING & UNLOADING STILLAGES ON & OFF TRUCKS

7. Loading & Unloading Stillages On & Off Trucks

Loading On The Trucks

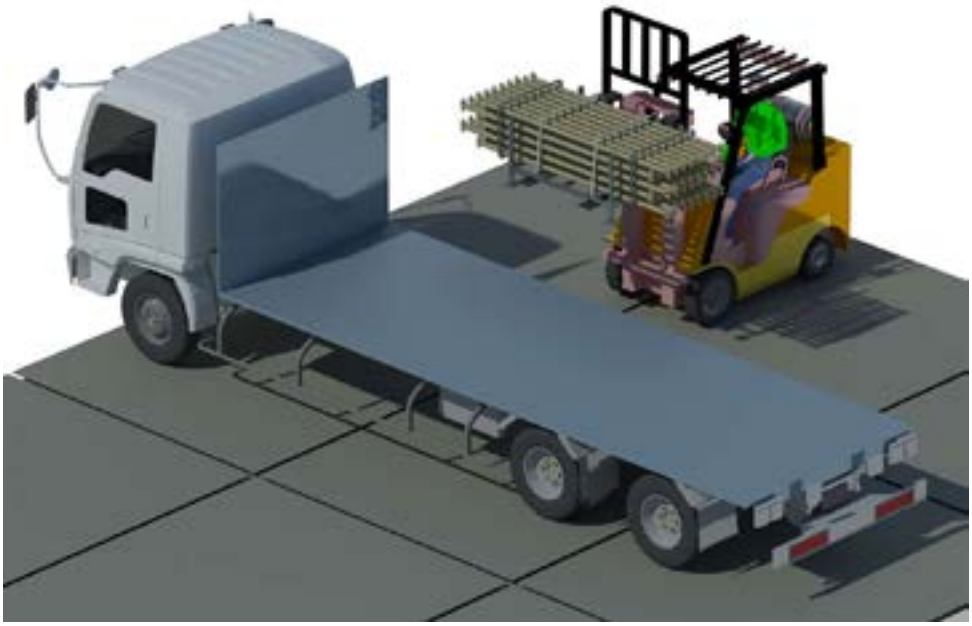
The guidelines below set out how to stack scaffolding stillages and restrain them onto the truck. These guidelines are detailed in the Performance Standards section issued by the National Transport Commission, NTC Australia, Load Restraint Guide 2018.

Loading and restrain goods on the transport vehicle may require engineer examination and certification.

Loading The Transport Vehicle At Acrow's Sites

Prior to commencing loading on the transport vehicle ensure:

- All components are fully strapped and secured into stillages.
- Stillages and components are defect free.
- Have a loading plan in place based on total loads and number of stillages and the type of the transport vehicle.
- Visually check the condition of the transport vehicle ensure its suitability for transporting of Acrow's components.
- Check the vehicle structures and restraint equipment are in good working condition and strong enough to restrain the load.
- Inspect all vehicle and restraint equipment before each trip to make sure it is in good working order.
- Check lashings. Even minor wear and damage may considerably reduce performance compared with the lashings' rated capacity, putting you and others at risk.
- Use forklift to load stillages into truck.
- Load only one stillage at each time.



7. Loading & Unloading Stillages On & Off Trucks

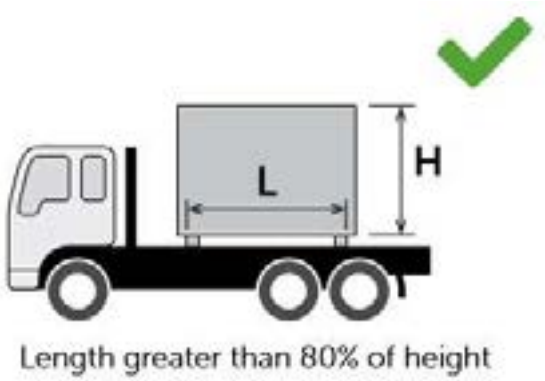
Load Stabilisation

Unstable and tall loads can tip over under heavy braking or cornering, even if they are restrained properly at the base.

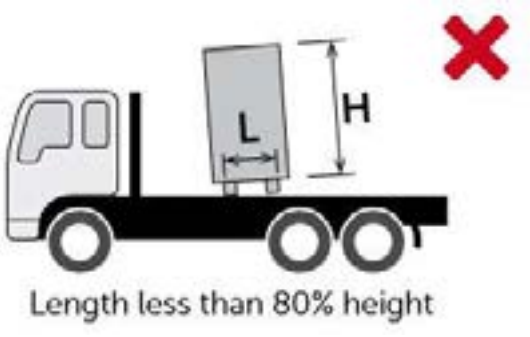
To increase the stability of loads:

- Place unstable loads against a rigid structure (such as a headboard) to prevent them from tipping.
- Strap several unstable items together to form a stable pack.
- Fully tension the lashings to increase load stability when using tie-down restraints.
- Use chains to secure unstable stillages if required as they have a limited amount of stretch.
- Use direct lashings to prevent a load tipping if further restraint is required.
- Don't mix and match chains and straps on the same load. They have different stretch factors and breaking points, which may cause lashing to fail. Always assess the restraint to its weakest point (for example, grab hooks may have a lower capacity than the chain's strength).

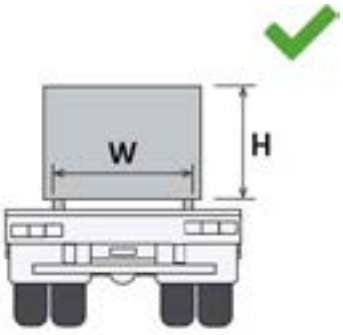
A tall load, such as 2 levels of stillages, can tip forwards if the length of the base is less than 80% of its height. It can tip sideways if the width of the base is less than 50% of its height.



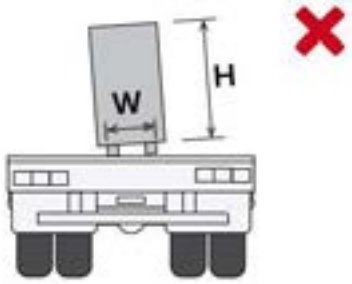
Length greater than 80% of height



Length less than 80% height



Width greater than 50% of height



Width less than 50% of height

7. Loading & Unloading Stillages On & Off Trucks

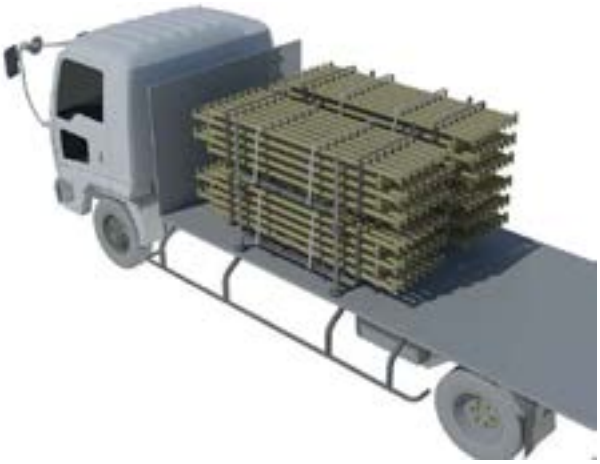
Stillage Loading Configuration

The configurations below are recommended method for loading stillages into the transport truck and increase load stability. These configurations are based on number of stillages to be transported on a single transport vehicle:

Place single stillage in the center of the truck, so load is evenly distributed. It is good practice to block the load against rated headboard.

Place 2 stillages in two rows, single level. Having the stillages closer to the truck surface edge, will increase the tie-down effectiveness as the tie-down angle is closer to 90°.

Place 4 stillages in two rows, two levels. The tie-down effectiveness is almost the highest, the tie-down angle is almost 90°.

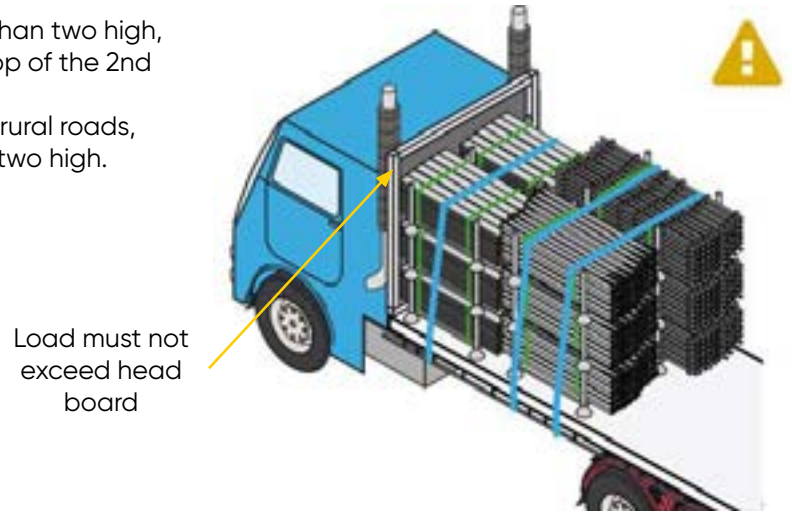


7. Loading & Unloading Stillages On & Off Trucks

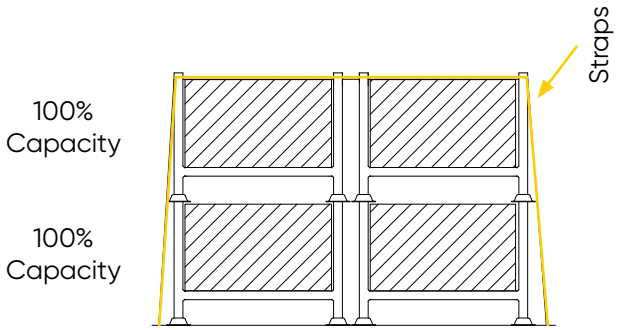
Height Of Stillages On The Transport Vehicle

Stillages can be stacked on top of each other on the transport vehicle to provided the below items are adhered to:

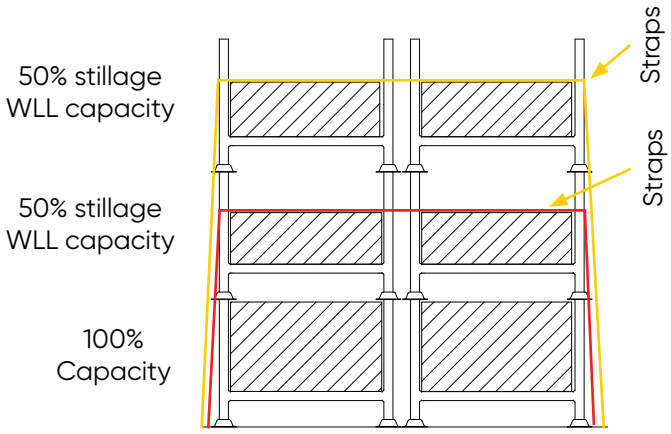
- Driver must ensure they maintain vehicle stability during transport of the load.
- Adequate straps are used to ensure load is sufficiently restrained.
- The load does not exceed the height of the headboard
- Avoid possible damaging of Acrow's stillage affected by the extra loads imposed while transport is in motion.
- If stillages are stacked greater than two high, a belly strap must be used on top of the 2nd stillage as a minimum
- If traveling long distances or on rural roads, consider only stacking stillages two high.



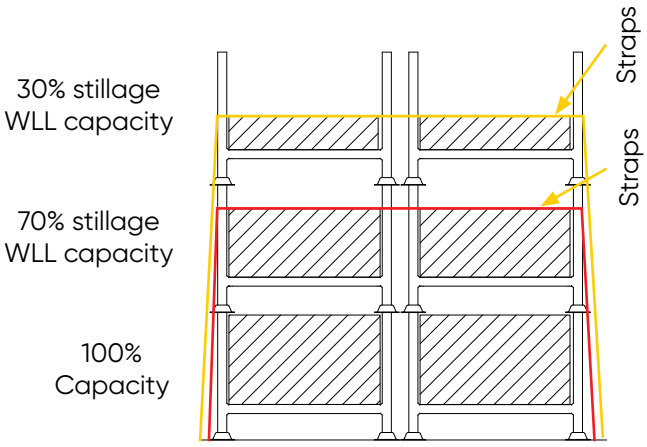
Alternative Stacking Options



1 Set of Straps



2 Sets of Straps



2 Sets of Straps

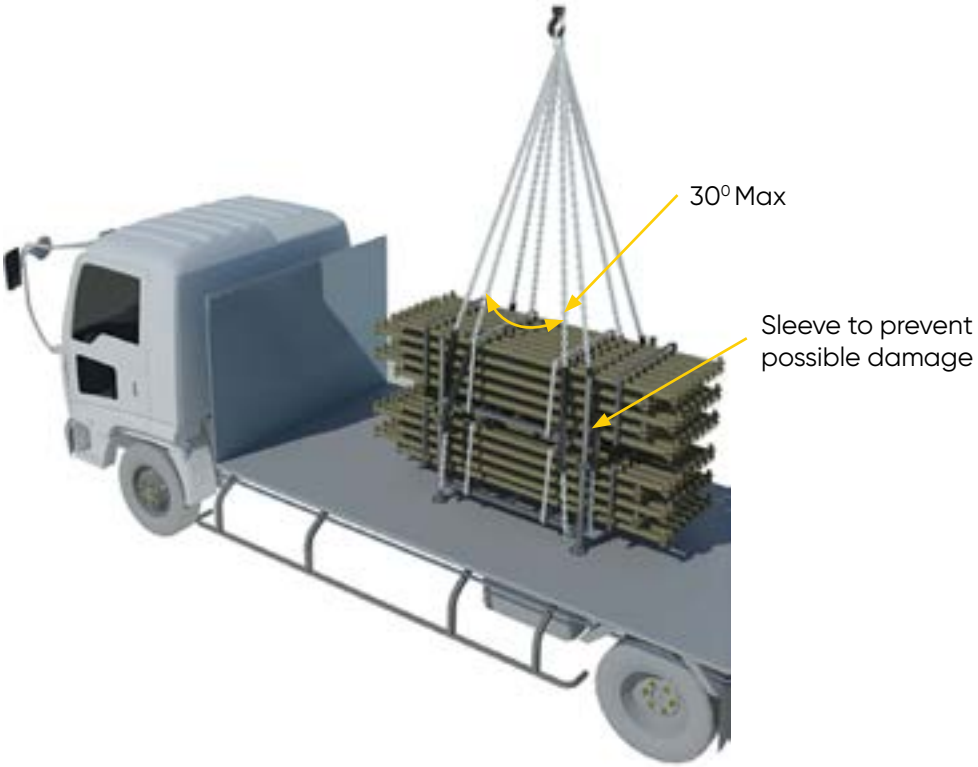
7. Loading & Unloading Stillages On & Off Trucks

Lifting & Unloading Of Stillages At Construction Site

The preferred and safest method of handling (loading and unloading) of stillages is always by mean of forklift. If crane handling is the only option, ensure:

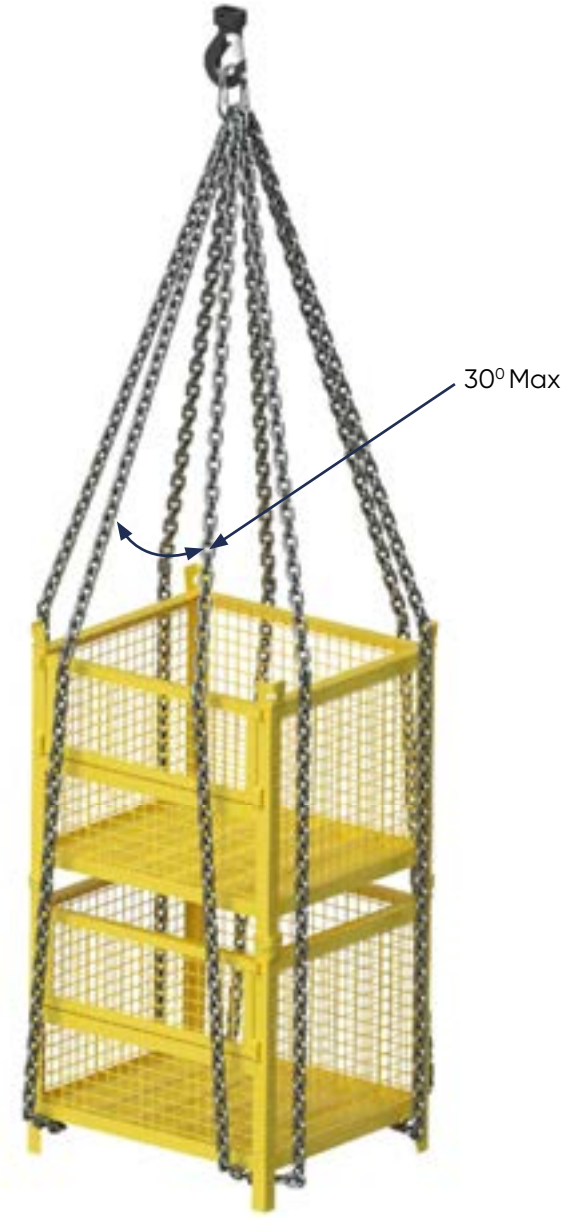
Prior to Handling:

1. Visually inspect and assess the stillage, its members & welds for any signs of damage and defect which may make the stillage unsafe and unfit for crane handling.
2. Check all components are intact and secured into the stillage via at least two straps.
3. It is recommended to use flat/webbing slings or sleeved chain with suitable capacity in order to prevent localised damage to welds and stillage members.
4. Qualified riggers/dogmen must assess and adopt a safe and proper rigging and handling of the stillage.
5. Stated WLLs shall not be exceeded.
6. Maximum two stillages may be lifted at any one time by a crane of suitable capacity as shown below providing total load does not exceed 2000kg otherwise each stillage should be lifted separately.
7. The stillage must be securely restrained and maintained by the crane's chains/slings.
8. Angle of Lift between the chains shall not be more than 30 degrees.
9. Do not use lifting loops (if it is attached) unless all lifting devices have been tested & certification and is current.



7. Loading & Unloading Stillages On & Off Trucks

A similar method and procedure shall be implemented for lifting cage stillages. An example of lifting stillages is provided below:



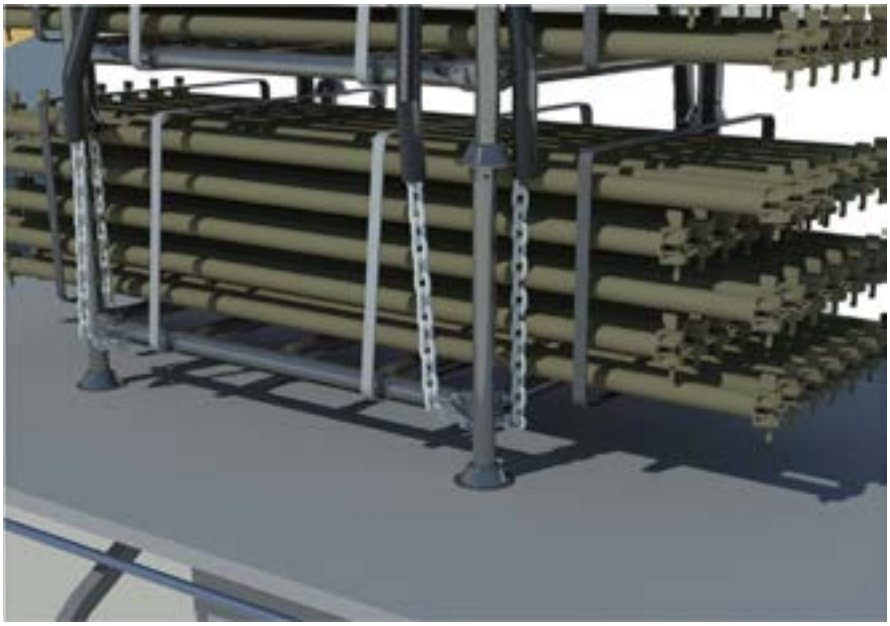
7. Loading & Unloading Stillages On & Off Trucks

Hooking The Chain Into The Stillage

The recommended procedure is to pass the chain diagonally and underneath the horizontal tubes member. Connect both chain's ends to the eye sling's hook. Use separate 4 chains of the same length.

If required when lifting two stacked stillages, strap both stillages together prior to any lifting to increase stability during handling.

Ensure the stillages are always levelled horizontally during handling.



7. Loading & Unloading Stillages On & Off Trucks

Restraining Stillages Onto The Truck

The aim of stillage restraining is to ensure stillages and components are firm on the truck, they are intact and the risk of falling components is nil.

It is a legal requirement to restrain the load so that:

- It does not come off the vehicle under normal driving conditions, including heavy braking and minor collisions.
- It does not negatively affect the stability of the vehicle, which can cause the vehicle to roll over or swerve uncontrollably, and cause an accident.
- It does not stick out of the vehicle in a way that could injure people, damage property or obstruct others' paths.

Performance Standard For Load Restraint

It is important ensuring stillages do not move in any direction (forward, backward or sideway) during movement and even in the unlikely event of collision. Forces from changes in speed, direction or slope may cause a load to shift. These forces result from normal driving conditions including braking, accelerating, cornering, road surfaces and air flow.

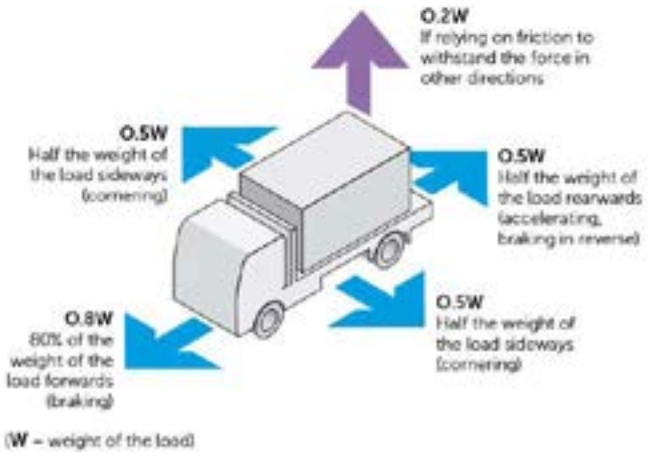
Moving loads will makes the vehicle unstable it can cause an incident, especially when taking corners. Movement is unacceptable if it negatively impacts on weight distribution or the stability of the vehicle.

Causes of load movement just like any unrestrained person in a vehicle, loads can move forwards, backwards, sideways and upwards. Forward shifts are caused by braking while driving forward, accelerating in reverse, downhill slopes. While backward shifts are caused by braking in reverse, accelerating forward, uphill slopes. Sideways shifts are caused by cornering, cambered roads. And upward shifts are caused by uneven road surfaces.

Restraining the load is must. The weight of a load is not enough to hold it in place. A heavy load is just as likely to fall off as a light load because the heavier the load, the higher the forces it experiences.

To comply with the law, if you're involved in packing, loading, moving or unloading a vehicle, as a vehicle owner, you are responsible for complying with load restraint laws.

The Performance Standards - Load Restraint Guide 2018 set out the minimum amount of force a restraint system must be able to withstand in each direction. For heavy vehicles, these forces are shown in the image below:



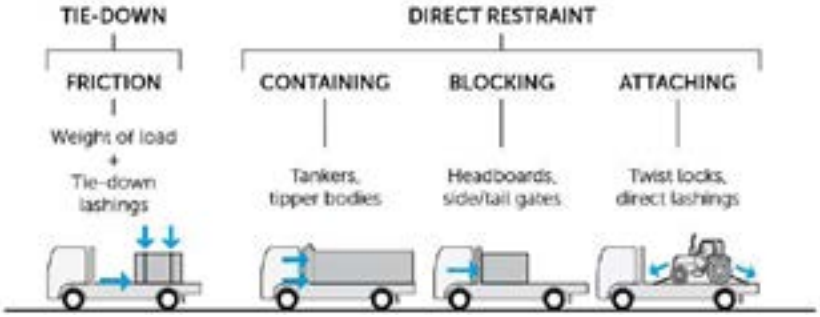
7. Loading & Unloading Stillages On & Off Trucks

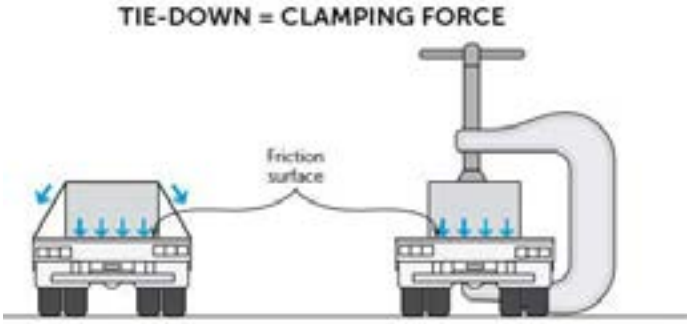
Stillage Load Restraint Method

While there are many methods of restraining loads into truck, the most applicable method for restraining stillages into the flat deck transport vehicle is the Tie-Down restraint.

Tie-Down restraint loads:

- Friction stops the load from moving forwards, sideways and backwards. Friction force comes from both the weight of the load and the clamping force of tie-down lashings. The weight of the load alone does not provide adequate restraint.
- For tie-down to be effective, the load must be in contact with the vehicle throughout its journey. Tie-down lashings clamp the load to the vehicle to maintain friction.





- Tie-down lashings include straps and chains. These normally pass over the top of a load and are attached to the vehicle on both sides.
- Tie-down lashings need to be pre-tensioned to create the clamping force. This is usually done using a mechanical tensioner suitable for the type of lashing you are using.
- When a load is tied down and restrained using friction, it must also be restrained vertically to withstand a minimum force of 20% of its weight (i.e. 0.2W); this stops it from shifting upwards (e.g. on rough roads) and keeps the load in contact with the vehicle throughout its journey.

7. Loading & Unloading Stillages On & Off Trucks

Defining Load Restraint

The National Transport Commission, NTC Australia, Load Restraint Guide 2018 defines how to calculate and determine number of tie-downs to restrain loads into truck for safe transport.

The Load Restraint Guide has pre-calculated tables that can be used to determine the number of tie-down lashes required to restrain a load.

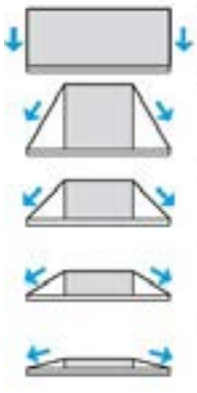
There are a few factors that determine the number of tie-downs. Below is a summary of these factors and how to utilize them efficiently for transporting ACROW's stillages and components.

This is a guide only, refer to appropriate guidelines for load restraint requirements. Acrow accepts no responsibility for securing loads.

Tie Down Lashing Angle

Tie-down lashings are most effective if they are vertical and tight. The more a lashing is angled away from the load, the less the clamping force.

- The lower the lashing angle, the more lashings are required to give the same clamping force. One strap at 90° is equivalent to four straps at 15°.
- Whether or not a load is blocked also affects the number of lashings needed. If a load is blocked using rated equipment, some of the required restraint will be achieved by that equipment.
- To find the number of lashings required for the load, divide the total weight of the load by the weight that each lashing can restrain and then round up to the next whole number. The pre-tension in a lashing does not equal the amount of weight it can restrain.



APPROX. ANGLE	TIE-DOWN ANGLE EFFECT	TIE-DOWN EFFECTIVENESS
90°	1.00	100%
60°	0.85	85%
45°	0.70	70%
30°	0.50	50%
15°	0.25	25%

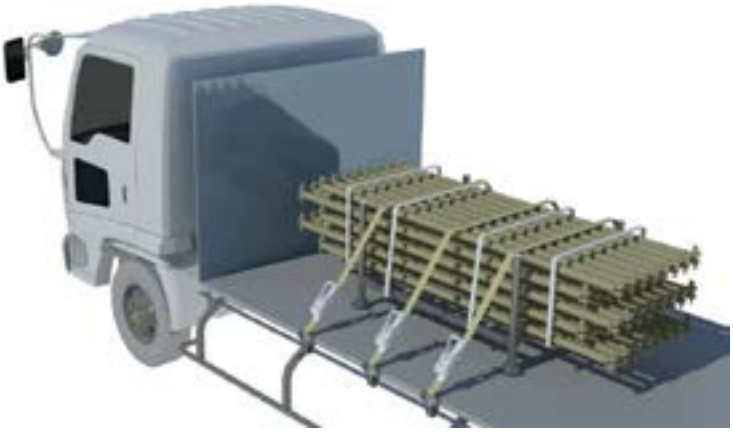
Thus, having the stillages adjusted to the edge of the truck or stacked on top of each other will increase lashes efficiency.

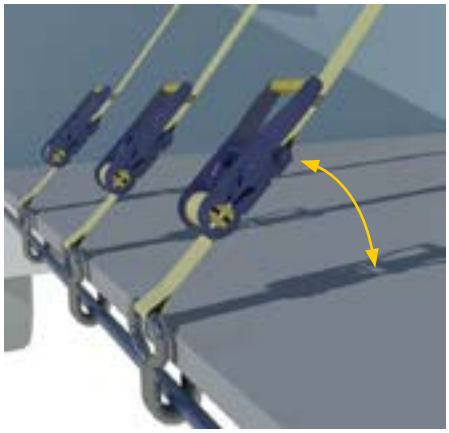
The recommended number of lashes for the common stillage loading configuration taking into consideration lashes angle is as follows on the next page:

7. Loading & Unloading Stillages On & Off Trucks

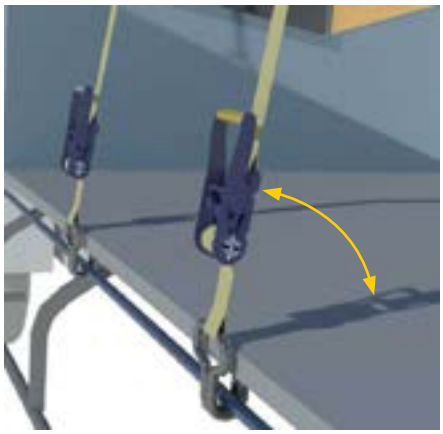
Tie Down Lashing Angle

One Stillage centrally located: Approx. Tie-Down Angle: 30°- 45° - Use Three Tie-Down Lashes.

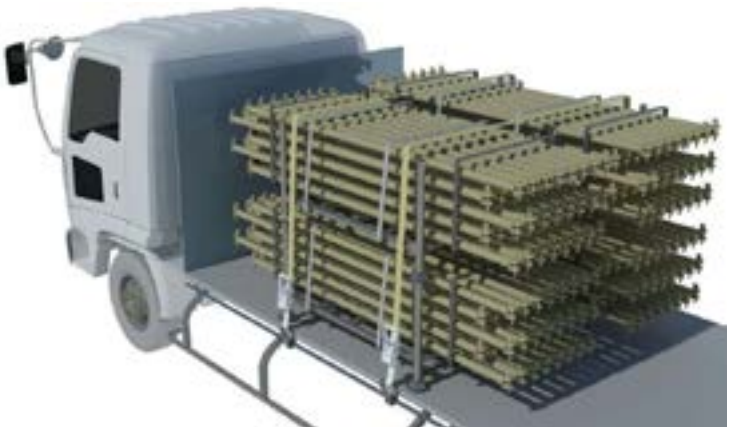


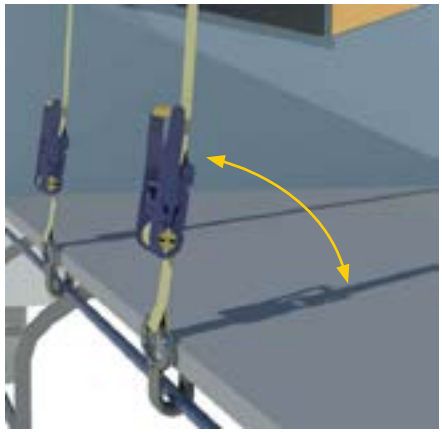


Two Stillages, single level: Approx Tie-Down Angle: 60°-80° - Use Two Tie-Down Lashes.



Two Stillages, two levels: Approx Tie-Down Angle: 90° - Use Two Tie-Down Lashes.





This is a guide only refer to appropriate guidelines for load restraint requirements. Acrow accepts no responsibility for securing loads.

7. Loading & Unloading Stillages On & Off Trucks

Increasing Friction Level

The amount of friction between the load and deck surfaces (and any surfaces in between) will affect how much weight each lashing can restrain. The greater the friction, the more weight that can be restrained by each tie-down lashing.

Typical friction levels for common loads are outlined below (Typical Friction Levels - Load Restraint Guide 2018 (P26).

TYPICAL FRICTION LEVELS	
Load	**Friction**
Wet or greasy steel on steel	VERY LOW
Smooth steel on smooth steel	LOW
Smooth steel on rusty steel	LOW TO MEDIUM
Smooth steel on timber	MEDIUM
Smooth steel on conveyor belt	MEDIUM
Rusty steel on rusty steel	MEDIUM TO HIGH
Rusty steel on timber	HIGH
Smooth steel on rubber load mat	HIGH

The amount of friction between the stillage's and the surface of the steel flat-bed truck can be increased by placing rubber or other suitable material on the deck prior to loading steel-based stillages onto the steel deck.

- When loading steel-based stillages onto a steel deck, place plywood, rubber or other suitable material on the deck to increase friction.

- Loading stillage s with steel bases directly onto steel decks creates a low-friction interface.

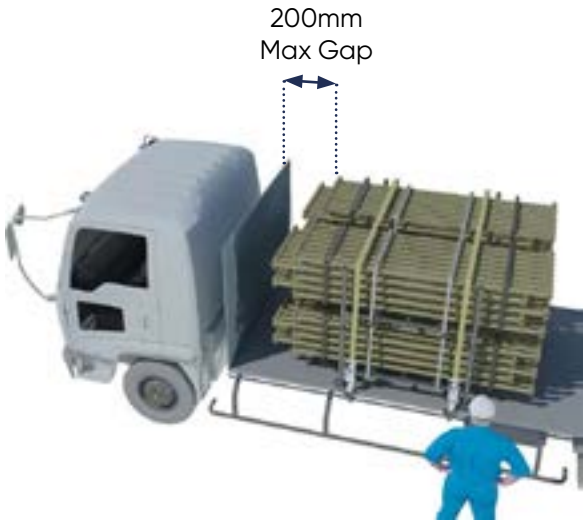
7. Loading & Unloading Stillages On & Off Trucks

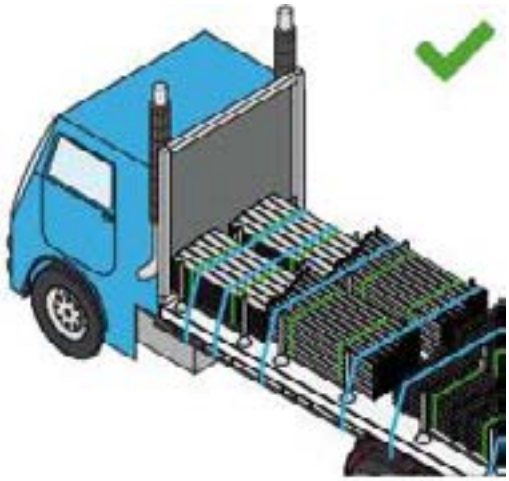
Blocking The Loads

It is a recommended practice using rated headboards when the load consists of long, slender products in multiple packs that may spear (e.g. pipes, beams, rail, logs).

Headboards are only affective if:

- If they are rated and strong enough to fully restrain heavy loads under heavy braking.
- The load does not sit above the height of the headboard, unless the packaging is of adequate strength to contain the product against the full forward force.
- The stillages are restraint using tie-down lashes. Having a rated headboard does not substitute the need for tie-down lashes.
- The load is placed as close as practical to the headboard, within 200 mm to the headboard.





7. Loading & Unloading Stillages On & Off Trucks

Examples Of Improper, Unsafe And Unacceptable Loading

- Three levels of stillage stacking.


- Using only one lash to tie-down stillages onto truck, plus partial wrapping.


- Components are not secured (strapped) into stillage.


7. Loading & Unloading Stillages On & Off Trucks

Examples Of Improper, Unsafe And Unacceptable Loading

- Overfilling and using damaged caged stillage. The upward movements of items is not restricted to prevent components from dislodging.


- Loose components. Not using caged stillage.


- Tie-down lashes are not effective.


7. Loading & Unloading Stillages On & Off Trucks

Examples Of Improper, Unsafe And Unacceptable Loading

- Components are subject to dislodging. The upward movement of items is not restricted. Also using the prohibited plastic tub.


- Unstable stillage loading process. Stillages are subject to slide during transport.


- Not using timber dunnage to separate long components.

8. DESIGN CRITERIA & PROCESS FOR TIE DOWNS

8. Design Criteria & Process For Tie Downs

Design for Tie-Down

Tie-down loads are restrained by friction between the load and the vehicle. Friction can also restrain load items in contact with other load items. The friction is a result of the weight of the load and the extra clamping force applied by lashings.

This is a guide only refer to appropriate guidelines for load restraint requirements. Acrow accepts no responsibility for securing loads.

Friction Coefficient

The friction coefficient (μ) is used to compare the load restraint friction force between two surfaces. The static friction coefficient applies before movement begins and the dynamic friction coefficient applies once movement occurs.

The dynamic friction coefficient is generally much lower than the static friction coefficient. This means a load may show some resistance to begin with, but once it starts slipping it will usually slip quickly. Where the design of a restraint system relies on the weight of the load plus lashing pre-tension, the static friction coefficient may be used.

Where the design relies on the weight of the load plus tensioning by load shift, the dynamic friction coefficient must be used. Typical static friction coefficients are listed in the table below.

Friction coefficient applicable to Acrow's Stillages

TYPICAL STATIC FRICTION COEFFICIENT LEVELS	
Load	**Static friction coefficient**
Wet or greasy steel on steel	0.01–0.1
Smooth steel on smooth steel	0.1–0.2
Smooth steel on rusty steel	0.2–0.4
Smooth steel on timber	0.3–0.4
Smooth steel on conveyor belt	0.3–0.4
Rusty steel on rusty steel	0.4–0.7
Rusty steel on timber	0.6–0.7
Smooth steel on rubber load mat	0.6–0.7

Lashing Pre-Tension

The pre-tension is the force in the lashing provided by a mechanical tensioner or a knot. The amount of pre-tension in a lashing affects the amount of weight that can be restrained by that lashing.

To maintain the friction force during normal driving, the load must always remain in contact with the deck during road vibration and over bumps.

To achieve this, the tie-down lashings must be pre-tensioned to provide a minimum clamping force of 20% of the weight of the load.

Note: The tension in any lashing must not exceed the manufacturer's lashing capacity. Average lashing pre-tensions are shown in the table on page 8.3. The figures shown in the table are operator and equipment dependent.

8. Design Criteria & Process For Tie Downs

Lashing Pre-Tension

The pre-tension on the side of the load that is tensioned is normally greater than the pre-tension on the other side (possibly several times greater). If the tensioner is positioned on top of the load, the pre-tension is the same on both sides. Always check the lashing pre-tension on both sides of a load, and never assume it is the same on both sides.

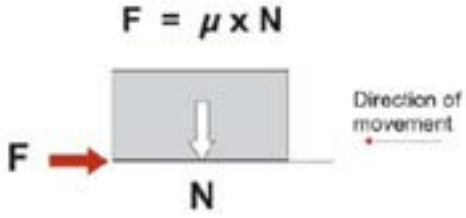
In some circumstances, for example lashings over high friction materials, it is advisable to establish the pre-tension that can be achieved by the equipment, and by each operator, using in-line load indicators.

EXAMPLES OF AVERAGE PRE-TENSION

Lashing	Size	Tensioner	Pre-tension
Rope	10 mm & 12 mm	Single hitch	50 kgf
		Double hitch	100 kgf
Webbing	25 mm	Hand ratchet	100 kgf
	35 mm	Hand ratchet	250 kgf
	50 mm	Truck winch	300 kgf
	50 mm	Hand ratchet (push-up)	300 kgf
	50 mm	Hand ratchet (pull-down)	600 kgf
Chain	7 mm & above	Turnbuckle	1000 kgf

Friction Forces

The friction force (F) can be calculated by multiplying the friction coefficient (μ) by the normal force (N) between the load and deck or any other surface the load sits on:

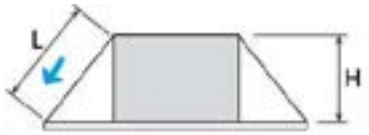


The normal force N is the weight (NW) of the load plus the tie-down force (N_L) from the combined vertical components of the lashing tensions.

$N = NW + N_L$

N_L is dependent on the lashing angle(s) and the lashing tension(s) and is equal to the sum of all of the lashing tensions on each side of the load, multiplied by the angle effect.

The angle effect can be calculated by dividing the height of the load by the length of the lashing between the load and the tie point on the vehicle. The angle effect is the sine of the lashing angle (a) relative to the horizontal (EA = sin a).



Angle effect (AE) = Height of load (H) ÷ Length of lashing (L)

8. Design Criteria & Process For Tie Downs

How Many Lashings Using The Tie Down Restraint Method

The following load tables are an example and can be used to determine the number of tie-down lashings required to restrain a load. Full list of tables covering wide range of loading scenarios is available via Number of Lashings - Load-Restraint-Guide-2018.

Note the following:

- The tables include loads with or without blocking in front, on high, medium, low and very low friction surfaces.
- They consider the required minimum clamping force of 20% of the weight of the load.
- If the tie-down provides the required 0.5 g sideways and rearward restraint it will also provide a 0.5g forward restraint.
- The tables are based on a headboard that is, on its own, capable of withstanding the forces resultant from 0.3 g.
- If the blocking used in the system provides less than 0.3 g forward restraint, you can still use the tables to calculate the number of lashings (but you will need to regard the load as unblocked).

NUMBER OF TIE-DOWN LASHINGS

50MM WEBBING STRAPS, PUSH-UP HAND RATCHET OR TRUCK WINCH

Lashings:	Tensioner:	Pre-tension:
50 mm webbing straps	Push-up hand ratchet or truck winch	500 kgf

BLOCKED
(RESTRAINED TO 0.5 G)

	Number of lashings	Lashing angle (from horizontal): At least 75° AE > 0.95	At least 60° AE > 0.85	At least 45° AE > 0.70	At least 30° AE > 0.50	At least 15° AE > 0.25
HIGH FRICTION	Static friction: 0.6	Example: Rusty steel on timber or smooth steel on rubber load mat (rice conveyer belt)				
	1	2,900 kg	2,500 kg	2,100 kg	1,500 kg	770 kg
	2	5,700 kg	5,100 kg	4,200 kg	3,000 kg	1,500 kg
	3	8,600 kg	7,700 kg	6,300 kg	4,500 kg	2,300 kg
	4	11,000 kg	10,000 kg	8,400 kg	6,000 kg	3,100 kg
	5	14,000 kg	12,000 kg	10,000 kg	7,500 kg	3,800 kg
	6	17,000 kg	15,000 kg	12,000 kg	9,000 kg	4,600 kg
	7	20,000 kg	18,000 kg	14,000 kg	10,000 kg	5,400 kg
	8	23,000 kg	20,000 kg	16,000 kg	12,000 kg	6,200 kg
	9	26,000 kg	23,000 kg	19,000 kg	13,000 kg	6,900 kg
	10	28,000 kg	25,000 kg	21,000 kg	15,000 kg	7,700 kg
MEDIUM FRICTION	Static friction: 0.4	Example: Smooth steel on timber				
	1	2,300 kg	2,000 kg	1,600 kg	1,200 kg	620 kg
	2	4,600 kg	4,100 kg	3,300 kg	2,400 kg	1,200 kg
	3	6,900 kg	6,200 kg	5,000 kg	3,600 kg	1,800 kg
	4	9,200 kg	8,300 kg	6,700 kg	4,800 kg	2,400 kg
	5	11,000 kg	10,000 kg	8,400 kg	6,000 kg	3,100 kg
	6	13,000 kg	12,000 kg	10,000 kg	7,200 kg	3,700 kg
	7	16,000 kg	14,000 kg	11,000 kg	8,400 kg	4,300 kg
	8	18,000 kg	16,000 kg	13,000 kg	9,600 kg	4,900 kg
	9	20,000 kg	18,000 kg	15,000 kg	10,000 kg	5,500 kg
	10	23,000 kg	20,000 kg	16,000 kg	12,000 kg	6,200 kg
LOW FRICTION	Static friction: 0.25	Example: Smooth steel on conveyer belt				
	1	575 kg	510 kg	420 kg	300 kg	150 kg
	2	1,100 kg	1,000 kg	840 kg	600 kg	310 kg
	3	1,700 kg	1,600 kg	1,200 kg	900 kg	460 kg
	4	2,300 kg	2,000 kg	1,600 kg	1,200 kg	620 kg
	5	2,800 kg	2,500 kg	2,100 kg	1,500 kg	770 kg
	6	3,400 kg	3,100 kg	2,500 kg	1,800 kg	930 kg
	7	4,000 kg	3,600 kg	2,900 kg	2,100 kg	1,000 kg
	8	4,600 kg	4,100 kg	3,300 kg	2,400 kg	1,200 kg
	9	5,200 kg	4,600 kg	3,800 kg	2,700 kg	1,300 kg
	10	5,700 kg	5,100 kg	4,200 kg	3,000 kg	1,500 kg
VERY LOW FRICTION	Static friction: 0.2	Example: Smooth steel on rusty steel				
	1	580 kg	540 kg	280 kg	200 kg	100 kg
	2	770 kg	690 kg	560 kg	400 kg	200 kg
	3	1,100 kg	1,000 kg	840 kg	600 kg	310 kg
	4	1,500 kg	1,300 kg	1,100 kg	800 kg	410 kg
	5	1,900 kg	1,700 kg	1,400 kg	1,000 kg	510 kg
	6	2,300 kg	2,000 kg	1,600 kg	1,200 kg	620 kg
	7	2,700 kg	2,400 kg	1,900 kg	1,400 kg	720 kg
	8	3,000 kg	2,700 kg	2,200 kg	1,600 kg	820 kg
	9	3,400 kg	3,100 kg	2,500 kg	1,800 kg	930 kg
	10	3,800 kg	3,400 kg	2,800 kg	2,000 kg	1,000 kg

NUMBER OF TIE-DOWN LASHINGS

50MM WEBBING STRAPS, PUSH-UP HAND RATCHET OR TRUCK WINCH

Lashings:	Tensioner:	Pre-tension:
50 mm webbing straps	Push-up hand ratchet or truck winch	500 kgf

UNBLOCKED
(RESTRAINED TO 0.8 G)

	Number of lashings	Lashing angle (from horizontal): At least 75° AE > 0.95	At least 60° AE > 0.85	At least 45° AE > 0.70	At least 30° AE > 0.50	At least 15° AE > 0.25
HIGH FRICTION	Static friction: 0.6	Example: Rusty steel on timber or smooth steel on rubber load mat (rice conveyer belt)				
	1	1,700 kg	1,500 kg	1,200 kg	900 kg	460 kg
	2	3,400 kg	3,100 kg	2,500 kg	1,800 kg	930 kg
	3	5,000 kg	4,600 kg	3,800 kg	2,700 kg	1,300 kg
	4	6,900 kg	6,200 kg	5,000 kg	3,600 kg	1,800 kg
	5	8,600 kg	7,700 kg	6,300 kg	4,500 kg	2,300 kg
	6	10,000 kg	9,300 kg	7,500 kg	5,400 kg	2,700 kg
	7	12,000 kg	11,000 kg	8,800 kg	6,300 kg	3,200 kg
	8	13,000 kg	12,000 kg	10,000 kg	7,200 kg	3,700 kg
	9	16,000 kg	14,000 kg	11,000 kg	8,100 kg	4,100 kg
	10	17,000 kg	15,000 kg	12,000 kg	9,000 kg	4,600 kg
MEDIUM FRICTION	Static friction: 0.4	Example: Smooth steel on timber				
	1	670 kg	610 kg	420 kg	320 kg	160 kg
	2	1,100 kg	1,000 kg	840 kg	600 kg	310 kg
	3	1,700 kg	1,500 kg	1,200 kg	900 kg	460 kg
	4	2,300 kg	2,000 kg	1,600 kg	1,200 kg	620 kg
	5	2,800 kg	2,500 kg	2,100 kg	1,500 kg	770 kg
	6	3,400 kg	3,100 kg	2,500 kg	1,800 kg	930 kg
	7	4,000 kg	3,600 kg	2,900 kg	2,100 kg	1,000 kg
	8	4,600 kg	4,100 kg	3,300 kg	2,400 kg	1,200 kg
	9	5,200 kg	4,600 kg	3,800 kg	2,700 kg	1,300 kg
	10	5,700 kg	5,100 kg	4,200 kg	3,000 kg	1,500 kg
LOW FRICTION	Static friction: 0.25	Example: Smooth steel on conveyer belt				
	1	260 kg	250 kg	190 kg	130 kg	70 kg
	2	520 kg	470 kg	380 kg	270 kg	140 kg
	3	760 kg	700 kg	570 kg	400 kg	210 kg
	4	1,000 kg	940 kg	770 kg	540 kg	280 kg
	5	1,300 kg	1,100 kg	950 kg	680 kg	350 kg
	6	1,500 kg	1,400 kg	1,100 kg	810 kg	420 kg
	7	1,800 kg	1,600 kg	1,300 kg	950 kg	490 kg
	8	2,100 kg	1,800 kg	1,500 kg	1,000 kg	560 kg
	9	2,300 kg	2,100 kg	1,700 kg	1,200 kg	630 kg
	10	2,600 kg	2,300 kg	1,900 kg	1,300 kg	700 kg
VERY LOW FRICTION	Static friction: 0.2	Example: Smooth steel on rusty steel				
	1	190 kg	170 kg	140 kg	100 kg	51 kg
	2	380 kg	340 kg	280 kg	200 kg	100 kg
	3	570 kg	510 kg	420 kg	300 kg	150 kg
	4	770 kg	690 kg	560 kg	400 kg	200 kg
	5	960 kg	860 kg	700 kg	500 kg	250 kg
	6	1,100 kg	1,000 kg	840 kg	600 kg	310 kg
	7	1,300 kg	1,200 kg	980 kg	700 kg	360 kg
	8	1,500 kg	1,300 kg	1,100 kg	800 kg	410 kg
	9	1,700 kg	1,500 kg	1,200 kg	900 kg	460 kg
	10	1,900 kg	1,700 kg	1,400 kg	1,000 kg	510 kg

This is a guide only refer to appropriate guidelines for load restraint requirements. Acrow accepts no responsibility for securing loads.

9. PROCESS FLOW & TRANSPORT AND MANUAL HANDLING CHECKLISTS

9. Process Flow & Transport And Manual Handling Checklists

Dispatch & Delivery Process

The process outline activities, the team involved and their responsibilities for dispatching of Acrow's hired or sold components.

Legend

Responsible ● Involved ● Receiver of Info ●

Process - Dispatch and Delivery								
Step	**Activity**	**Sales Rep**	**Client**	**Admin Team**	**Yard Manager**	**Transport Team**	**State Manager**	**Additional Info**
1	**Generate Dispatch Scenario**	●						
2	Purchase Order secured	●	●			●	●	Early advising the transport team
3	Delivery date confirmed	●	●					
4	Delivery method confirmed	●	●					
5	Generate picking slip (2 Copies)	●		●	●			Hard copy - print out
6	Placing picking slip on yard jobs board	●		●	●			
7	Advise yard manager about new jobs	●						
8	**Packing of components**					●		
9	Pick up the picking slip				●	●		Only one copy to be picked up
10	Confirm availability and meeting delivery date					●		
11	Compile components onto stillages/ Pallets/ Bags					●		
12	Return the picking slip to the dispatch job board				●	●		
13	**Back Orders**							
14	Yard manager to inform the admin team for any Back Orders				●	●		
15	Advise the sales rep about the back order				●	●		
16	Advise the client about the back order	●	●					Offer alternatives as options
17	Confirm the need for back order	●		●	●			
18	Place the back order picking slip on the yard jobs board			●				
19	**Re-checking the purchase order**							
20	Compile the two picking slips			●				

9. Process Flow & Transport And Manual Handling Checklists

Dispatch & Delivery Process

The process outline activities, the team involved and their responsibilities for dispatching of Acrow's hired or sold components.

Legend

Responsible ● Involved ● Receiver of Info ●

Process - Dispatch and Delivery								
Step	**Activity**	**Sales Rep**	**Client**	**Admin Team**	**Yard Manager**	**Transport Team**	**State Manager**	**Additional Info**
21	Check information in both picking slips			●				
22	Check the purchase order	●		●				Notify sales rep
23	Check the total number of components against the system			●	●			
24	Update the system - ready for delivery			●	●			
25	**Arranging delivery**							
26	Arrange and books transport or inform client to pick up order			●	●	●		
27	Generate delivery docket	●		●	●	●		
28	Check booking number is clearly printed on the original delivery docket			●				
29	Check bay number clearly printed on client's copy			●				
30	Place two printed delivery dockets on the delivery notice board							
31	Re-update the client about the delivery			●	●			
32	**Delivery of goods**							
33	Transport driver pick up both delivery dockets			●	●	●		
34	Load and strain goods into transport vehicle				●			
35	Delivery docket signed by the transport driver and yard manager confirming materials and quantities				●	●		
40	Signed delivery dockets handed to admin team prior to leaving					●		Driver to keep customer copy of delivery docket

9. Process Flow & Transport And Manual Handling Checklists

Components Returns Process

The process outline activities, the team involved and their responsibilities for Acrow's hired components returned from site.

Legend

Responsible ● Involved ● Receiver of Info ●

Components Returns Process								
Step	**Activity**	**Sales Rep**	**Client**	**Admin Team**	**Yard Manager**	**Transport Team**	**State Manager**	**Additional Info**
1	**Arrange for pick-up from site**			●				
2	Confirming the pick-up date		●	●	●	●		Applicable if Acrow in charge of pick-up
3	Arrange the pick-up transport	●		●	●	●		
4	**Transport arriving at Acrow's yard**							
5	Transport vehicle parked at Acrow's yard			●		●		
6	Photographing the load on the truck			●		●		
7	Save photos to server			●				Check the purchase order number
8	Generate offload docket and count sheet hand it over to transport driver			●	●	●		
9	Hand the offload docket and count sheet to transport driver			●		●		
10	**Unloading the goods**			●	●			
11	Conduct safety inspection before unloading				●			Is it safe to unload?
12	Count and sort components				●			
13	Inspect and identify components required repair and or cleaning				●			Refer to repair and cleaning process flow
14	Fill-in the offload docket and count sheet				●			
15	Hand back the offload docket and count sheet to admin team			●	●			
16	**Compile quantities**							
17	Match goods supplied with goods returned (Offload docket and count sheet)				●			
18	Generate outstanding hire items quantities (if applicable)			●	●			

9. Process Flow & Transport And Manual Handling Checklists

Components Returns Process

The process outline activities, the team involved and their responsibilities for Acrow's hired components returned from site.

Legend

Responsible ● Involved ● Receiver of Info ●

Components Returns Process								
Step	**Activity**	**Sales Rep**	**Client**	**Admin Team**	**Yard Manager**	**Transport Team**	**State Manager**	**Additional Info**
19	Inform client about the outstanding hire items (if applicable)	●		●				
20	**Invoicing the job closure**							

9. Process Flow & Transport And Manual Handling Checklists

Stillage Inspection And Maintenance Process

The process outline activities, the team involved and their responsibilities to ensure stillages are defect free, fit for operation, fit for lifting (forklift and crane handling) and that their stacking or load carrying ability isn't adversely affected.

The process also describes the level of maintenance required to be carried after the inspection of stillages.

Legend

Responsible ● Involved ● Receiver of Info ●

Stillage Inspection & Maintenance Process								
Step	**Activity**	**Yard Manager**	**Yard Team**	**Maintenance team**	**Engineering**	**State Manager**	**National Management**	**Additional Info**
1	**Visual Inspection**	●						
2	Check horizontal (base) members are bend free	●	●					
3	Check vertical (legs/ posts) members are bend free	●	●					
4	Check welds are free from cracks	●	●					
5	Check for signs of tear that can lead to leg/ post collapsed	●	●					
6	Check that all foot plates are intact	●	●					
7	Check the stillage is free from deep rust, corrosion and pitting	●	●					
8	Check there is no concrete build-up	●	●					
9	Check components water drainage are not blocked	●	●					
10	**Define the level of maintenance**							
11	Minor defect to be fixed on the spot	●	●	●				Such as removal of concrete build-up
12	Moderate defect, isolate and engage the maintenance team	●	●	●	●	●		Such as bent leg and cracked weld
13	Major defect, isolate, engage maintenance team and recommend carrying maintenance or disposing			●	●	●		Such as deep rust
14	**Define if design modification is required**							
15	Engineering investigate any possible design defect			●	●	●		

9. Process Flow & Transport And Manual Handling Checklists

Stillage Inspection And Maintenance Process

The process outline activities, the team involved and their responsibilities to ensure stillages are defect free, fit for operation, fit for lifting (forklift and crane handling) and that their stacking or load carrying ability isn't adversely affected.

The process also describes the level of maintenance required to be carried after the inspection of stillages.

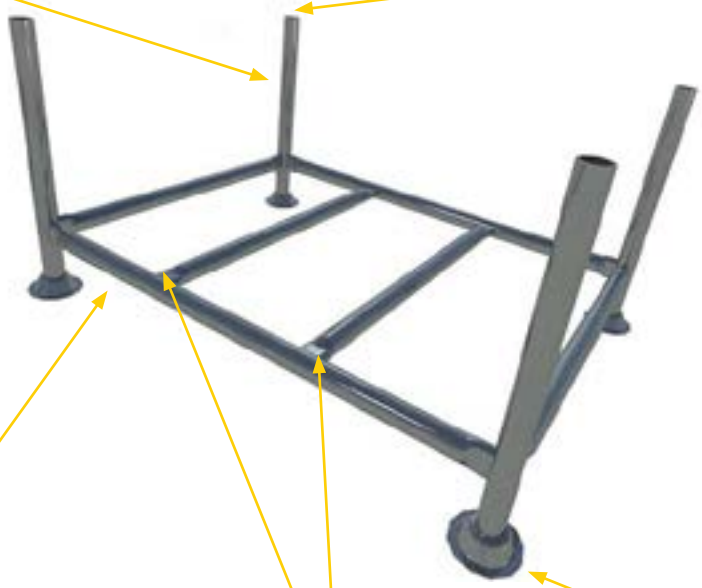
Legend

Responsible ● Involved ● Receiver of Info ●

Stillage Inspection & Maintenance Process								
Step	**Activity**	**Yard Manager**	**Yard Team**	**Maintenance team**	**Engineering**	**State Manager**	**National Management**	**Additional Info**
16	Issuing of safety alert	●	●	●	●	●		
17	Engineering to define a proper solution	●	●	●	●	●	●	
18	Approval of design modification				●	●	●	
20	Carry out modification			●	●	●		

Bent Vertical Members
Straighten minor bent posts (less than 100mm deviation) Check welds at base of leg for cracks.

Concrete Build-Up
Remove all concrete build-up. Ensure posts water drainage holes are clear.



Bent Horizontal Member
Straighten members if bend is more than less than 300mm deviation. Check welds for cracks.

Cracked Welds
Grind cracked welds flush to other tube surface and re-weld.

Missing or Crushed Feet
Replace feet, and weld following welding procedure. Check correct level with other feet.

9. Process Flow & Transport And Manual Handling Checklists

Transport And Manual Handling Checklists

Summary of provide guidelines for the safe storage, handling, maintenance and transport of ACROW STILLAGES.

Understanding Safe Work Practices Checklist

Understanding Safe Work Practices Checklist		✓
Training and Competency	Ensure the team involved are trained, licensed and competent to manage loading, unloading and delivery of components.	
	Loading and unloading procedure is documented and communicated clearly to the team involved.	
	Site conditions, loading and unloading zone, and exclusion zones is documented and communicated.	
	Team understand responsibilities and authority.	
Safety Procedure	Ensure the individual is wearing the required Personal Protection Equipment.	
	Ensure adhering to safe work procedure issue by Acrow and the construction site protective clothing.	
Planning the Loading	Load, vehicle and equipment characteristics has been considered prior to loading.	
	Appropriate loading equipment is used.	
	Appropriate load restraint equipment and methods is used.	
	Load mass and dimension limits for load and route is obeyed.	
	Load is fully stabilised and restrained.	
During Transport	Drive at an appropriate speed for the driving conditions.	
	Understand the effect the load type and its position can have on the vehicle's stability, steering and braking capacity.	
	Study the route, make allowances for high and wide loads when driving around corners, under bridges and electric cables.	
	Check the load and lashings regularly during the journey to make sure the load remains secure.	
	Check the load and its restraint regularly during the journey as some loads can settle and shift during a journey.	
Planning the Unloading	Check the load for movement or stability before removing restraints and unloading.	
	Use appropriate equipment for unloading.	

9. Process Flow & Transport And Manual Handling Checklists

Suitability Of Equipment Used In Packing, Loading And Load Restraint Checklist

Suitability of Equipment Used in Packing, Loading and Load Restraint Checklist		✓
Stillages	Ensure stillages are defect free, fit for operation and fit for lifting and stacking.	
	WLL is clearly marked on the stillage.	
	Only Acrow stillages is used.	
	Plastic Tubs can not be used for transporting of components.	
The Transport Vehicle	Ensure the transport vehicle has a valid registration and road worthy.	
	Ensure the driver has a valid driving license.	
	Check for any wear and damage on the vehicle such as tires or body	
	Check the carrying capacity: General Mass Limits and Mass limits for single axle.	
	Ensure the legal mass and dimension requirements of the vehicle meets The Heavy Vehicle National Law issued by the National Heavy Vehicle Regulator.	
	Vehicle structures is strong enough to withstand the forces.	
The Forklift	Forklift is maintained and safe to operate	
	Forklift operator is licensed and trained.	
	Forklift lifting capacity suited for loading and unloading load.	
Quality Of Lashing	Check locking and latching mechanisms are fully functional.	
	Check the lashings free from wear and damage and in good working order.	
	Restraint equipment is rated by manufacturers to indicate its restraint capacity.	
	Restraint equipment are strong enough to withstand the load's forces.	
	Use rated equipment. Any vehicle structures and indicated in the Performance Standards.	
Straps	Minimum 19 mm wide x 0.56mm steel straps is used	
	Break Load not less than 7Kn	
	Ultimate tensile strength UTS not less than 700kg	
Lifting Chain And Shackles	Suited for lifting and handling stillages via crane.	
	Tested and certified.	

9. Process Flow & Transport And Manual Handling Checklists

Stillage Loading And Strapping Checklist

Stillage Loading and Strapping Checklist		✓
Stillage Size And Size	Suited the components type and size.	
	Stillage capacity is maintained after loading "WLL" Refer to Stillage Palletization Chart.	
Stillage Loading	Direction of loads is maintained perpendicular to the central cross members.	
	Load is centrally placed to maintain balance during transporting and lifting.	
	Load is levelled and evenly distributed.	
	Load height is maintained below the top of the four posts.	
	Load is maintained within the stillage, between vertical posts.	
	Circular components united in packs.	
	Marinating an even number of components is maintained for stock control and enhancing productivity.	
Strapping the Components into the Stillage (Two Levels)	Level 1: Strapping the components as a bundle independently from the stillage.	
	Minimum two straps are used, one in each end of the bundle.	
	Bundles are strapped outside the stillage post/legs.	
	Level 2: Strapping the components into the stillage.	
	Minimum two straps are used, one in each end of the stillage.	
	Straps are placed closer to the stillage Leg/Post.	
Plastic Wrap of Stillage	There is a need for plastic wrapping.	
	Plastic wrap guideline is followed.	
	Components should be strapped into stillage prior to commencing wrapping. Wrapping is not a substitute for strapping.	
	No sign of partial wrapping.	
Straps	Minimum 19 mm wide x 0.56mm steel straps is used	
	Break Load not less than 7Kn	
	Ultimate tensile strength UTS not less than 700kg	

9. Process Flow & Transport And Manual Handling Checklists

Stillage Stacking At Acrow's Yard Checklist

Stillage Stacking at Acrow's Yard Checklist		✓
Stillages Stacking Design Criteria	The maximum height of 6 stillages is maintained.	
	Maximum load of 1000Kg per stillage is maintained.	
	Stillages are placed on sound and firm foundation is not subject to settlement, water runoff and puddling.	
	Nominal service wind not exceeding 65Kph.	
	The stillages are damage and defect free.	
	Stillages are aligned vertically, the four stillage foot plate are resting on the Centre of the four posts of the stillage underneath.	
Consideration Prior to Stacking of Stillages	Components are fully strapped and secured into stillage prior to stacking.	
	Components are fully restrained on the stillage prior to stacking.	
	Stillages is wrapped if required before stacking.	
	Label product and print quantities for future reference and stock take.	
	Stillages can be accessed by forklift after stacking.	
	Stillages stacked away from neighbour boundary	

Loading The Transport Vehicle At Acrow's Yard Checklist

Loading the Transport Vehicle at Acrow's Yard Checklist		✓
Prior to Commencing Loading	All components are fully strapped and secured into stillages.	
	Stillages and components are defect free.	
	Loading plan is in place showing total loads and number of stillages based on the transport vehicle specifications and capacity.	
	Transport vehicle condition is visually checked ensure its suitability for transporting of Acrow's components.	
	Vehicle structures is inspected and are in good working condition and safe to transport Acrow's stillages.	
	Forklift condition is checked to load stillages into truck.	
	Only one stillage is loaded at each time.	
Load Position to Maintain Vehicle Stability	Centre of gravity low and close to the vehicle's centerline.	
	Heavy objects loaded first, do not offset them to one side of the vehicle.	
	Check the rollover stability. Static rollover threshold (SRT) is a basic measure of rollover stability.	
	Load are spread evenly across the deck, and share the weight between the axles.	
	Load is not excessively project from front or sides of the vehicle.	
	Load is projections away from the driver to minimise the risk to the driver if the load shifts during braking or a collision.	
Increase the Stability of Loads	Unstable loads placed against a rigid structure.	
	Strap several unstable items together to form a stable pack.	
	Lashes are fully tension.	
	Direct lashings are used to prevent a load tipping if further restraint is required.	
	There is no mix and match chains and straps on the same load.	
	Stillage Loading Configuration is maintained.	
	Stillages height on the transport vehicle is maintained (Max two stillage).	

9. Process Flow & Transport And Manual Handling Checklists

Stillages Tie-Down Checklist

Stillages Tie-Down Checklist		✓
Total Load and Friction	The total weight of the load is calculated.	
	The level of friction of the load is calculated / estimated.	
	Interlayer packing is used to increase friction levels.	
Choose the Tie-Down Lashing Equipment	Lashings are correctly pre-tension.	
	Smooth and rounded corner is used to protectors to prevent lashings losing tension during the journey.	
	Place every second tensioner is placed on the opposite side of the vehicle to maintain even load restraint.	
	Two tensioners are used on each lashing (one on each side of the load).	
Check the Efficiency of Tie-Down Lashing	Check the angle the lashings are checked.	
	Dunnage is required to increase the angle if load is too low to use tie-down lashings.	
	There are enough tie-down lashings to restrain all parts of the load.	
	Lashes is strong enough for the load.	
The Need to Use Timber Dunnage	Timber is relatively free of knots and splits.	
	Timber is placed on its widest face. Stacked at right angles.	
	Timber dunnage is not placed on its narrow face or stack it directly on top of itself.	
	Dunnage is lashed and secured.	

LOCATIONS

NEW SOUTH WALES

National Head Office
Formwork & Scaffold
2a Mavis Street
Revesby NSW 2212
P: 02 9780 6500
F: 02 9780 6499
E: info@acrow.com.au

Sydney
Screens Head Office
13-15 Vallance Street
St Marys NSW 2760
P: 02 9219 1566

VICTORIA

Melbourne
Formwork, Scaffold & Screens
1651-1657 Centre Road
Springvale VIC 3171
P: 03 9582 2777
F: 03 9582 2790

QUEENSLAND

Brisbane
Formwork & Scaffold
280 Bilsen Road
Geebung QLD 4034
P: 07 3265 2266
F: 07 3865 0277

Beenleigh
Screens & Formwork
2 Morrison Lane
Beenleigh QLD 4207
P: 07 3807 9800

Beenleigh
Industrial Scaffold
22a Spanns Road
Beenleigh QLD 4207
P: 07 3442 4000

Gladstone
Industrial Scaffold
48 Chapple Street
Gladstone QLD 4680
P: 07 4972 3200

Mackay
Industrial Scaffold
247 Boundary Road E
Paget Mackay QLD 4740
P: 07 4952 1966

Townsville
Industrial Scaffold
8-12 Webb Drive
Mount St John QLD 4818
P: 1300 11 22 47

SOUTH AUSTRALIA

Adelaide
Formwork & Scaffold
26 Circuit Drive
Hendon SA 5014
P: 08 8359 9700
F: 08 8359 1366

WESTERN AUSTRALIA

Perth
Formwork & Scaffold
11 Jackson Street
Bassendean WA 6054
P: 08 9373 7200
F: 08 9379 3488

TASMANIA

Hobart
Formwork & Scaffold
93 Lampton Avenue
Moonah TAS 7009
P: 03 6277 1212
F: 03 6277 1290

Launceston
Formwork & Scaffold
65 Boland Street
Launceston TAS 7250
P: 03 6324 8282
F: 03 6324 8250

acrow.

ENGINEERING & CONSTRUCTION

Contact

Phone: 1300 138 362

www.acrow.com.au