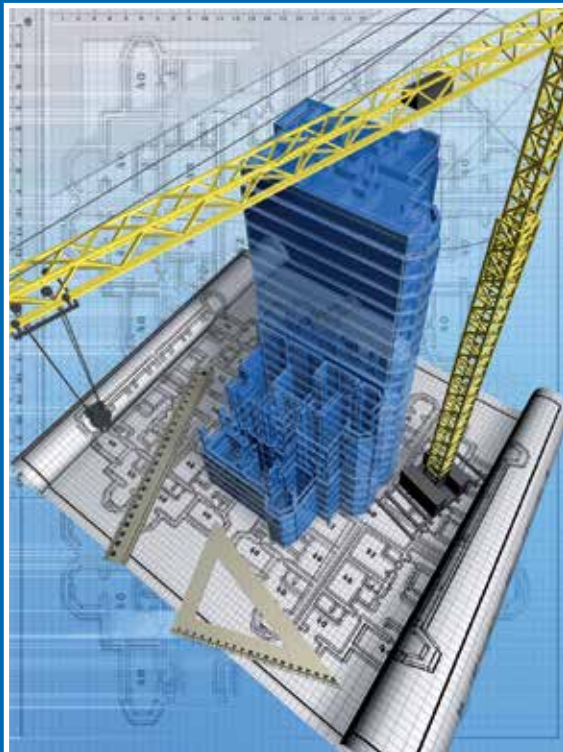




Conlift Concrete Lifting Systems Safety and Installation Manual



This booklet was issued in November 2011 and supersedes all previous booklets with respect to these products.

Due to ongoing research and development, changes may occur to specifications and features without notice. It is recommended that you consult with Parchem Construction supplies Pty Ltd or download the most current version of the handbook from www.parchem.com.au . **The information in this booklet should be read in conjunction with the Conlift Design Manuals.**

DISCLAIMER

These instructions are intended only for use by suitably qualified professional building, construction and erection specialists.

Parchem Construction Supplies Pty Ltd expressly excludes all liability for an injury, damage, cost, expense or claim whatsoever suffered by any person resulting either directly or indirectly from a failure to install the Conlift Precast and Tilt Up products in accordance with these installation instructions.

CONTENTS

- Safe Site.
- Planning and Preparation.
- Types and Installation of Anchors.
- Stripping.
- Rigging.
- Lifting.
- Strongbacks.
- Bracing.

STANDARDS

Construction professionals, design engineers and all users of Conlift products should refer to the recommendations of the following statutory authorities, industry groups and publications.

AS3850-2003 Tilt-up Concrete Construction

National precast Concrete Association of Australia

National Code of Precast, Tilt-up and Concrete Elements in Building Construction

Precast Concrete Handbook

Workplace Health and Safety Qld – Tilt-up and Precast Construction Code of Practice

Worksafe Victoria

Worksafe Western Australia

WorkCover Authority of NSW

Safework SA

Workplace Standards Tasmania

SITE SAFETY



WARNING: Erecting concrete panels and concrete elements is a high risk activity. Adequate safety controls must be in place in conformance with legislation and codes of practice.

A risk assessment must be carried out by the contractor identifying all risks/hazards and measures to control or eliminate the identified risks/hazards. A safe work method statement (**SWMS**) must be prepared before the high risk construction activity commences.

All lifting products are to be installed in accordance with the specifically designed technical drawings and instructions. Under no circumstances is a concrete panel to be lifted without a lifting design drawing certified by a qualified engineer and a rigging diagram.

Lifting must only be carried out by licenced crane companies operated by fully qualified and experienced crane operators and riggers.

Always maintain and enforce a clearly marked isolation zone around the lifting area in accordance with national and state codes of practice.

The appropriate personal protective equipment (safety eyewear, gloves, hardhats, hi-visibility vests and safety footwear) is to be worn during all stages of the production, transportation and installation of concrete elements.

PLANNING AND PREPARATION

1. BUILDING AND SITE LAYOUT

- Date and Engineer's Name.
- Project Location and Name.
- Building Location on the Site.
- Structural and Reinforcement Steel.
- Panel Positioning.
- Connection Details.
- Crane Position.
- Site Shed Positions.
- Casting Bed Layout and Casting Sequence for Tilt-up or Delivery Layout and Delivery Sequence for Precast.

2. PANEL DRAWINGS

- Date, Designers Name and Revision.
- Project Location and Name.
- Panel Number, Elevation and Mass.
- Panel Measurements and Centre of Gravity.
- Type of Lifting Inserts.
- Location, Orientation & Depth of Lifting & Other Inserts.
- Type, Size and Location of Reinforcing Inserts.
- Connection Details – Panels, Footing, Steel, Slab.
- Concrete Cover for Reinforcement.
- Strong-back Type and Fixing Details.
- Concrete Strength at Pour and Lift.
- Type and Location of Bracing Points.
- Bond-breaker/ Release Agent.

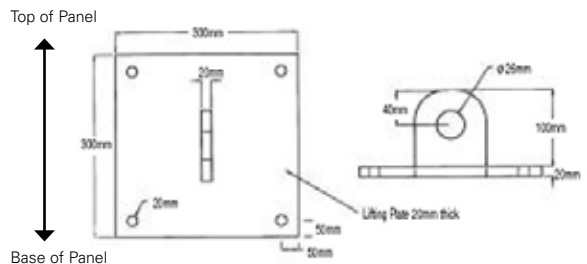
3. ERECTION DETAIL

- Project Location and Name.
- Erection Sequence.
- Prop Specifications and Capacities.
- Details of Prop Base Connection.
- Details of Prop Head Connection.
- Details of Dead-men if Applicable.
- Details of Strong-back Connection if Applicable.
- Levelling Pad Details.

TYPES AND INSTALLATION OF ANCHORS

1. FACE LIFT – 5T Conclift Mushroom Head Foot Anchor or 5T Conclift Plate Anchor

- The Mushroom Head Foot Anchor is a complete Unit installed with 2 N12 x 300 Rebars tied to both the Unit and the Panel Reinforcing and is used with the 5T Conclift Mushroom Head Clutch.
- The Plate Anchor is a complete Unit installed with 2 N12 x 300 Rebars tied to the Unit and the Panel Reinforcing and is used with the 5T Conclift Donut Head Clutch.
- The Arrow on the Oval Plastic Recess Former must point to the top and the bottom of the panel.
- The Initial Lift of the Casting Bed or Casting Table is in Tension. The Placement Lift puts the Anchor in Shear.
- The Anchors are stamped with the Conclift Logo and 5T WLL. These Anchors have a Safety Factor of 2.5.
- The Concrete Strength, distance between the Anchors and the distance from any edge are a major factors in the Capacity of the Anchor. Please refer to the appropriate Conclift Data Sheet.
- Do not weld.



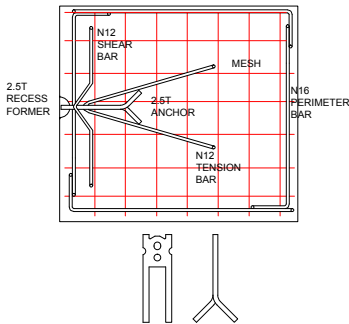
LIFTING PLATE

To replace a lost lifter or to provide an alternate lifting position, it is to be installed with load controlled expansion anchors that are correctly torqued. Size as specified by the Engineer or Lifting Design.

2. EDGELIFT – 2.5T, 7T and 10T Conlift Plate Anchor

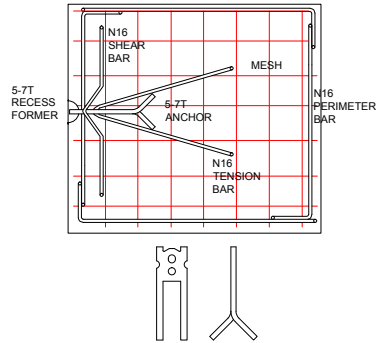
- The 2.5T Plate Edgelifter is installed with a re-useable rubber recess former fixed to the formwork. It has a N12 shear bar installed over the edge of the Anchor, parallel to the top edge. If shear force is exerted in both directions, the Anchor will require a shear bar across both edges, one in each face. It has N12 with 500mm legs Tension Bar placed through the lower hole in the Anchor. The Reinforcing Mesh and Perimeter Bar sit between the 2 legs of the Anchor. The Anchor, Shear Bar and Tension Bar are tied to the Reinforcing Mesh and Perimeter Bar. The Anchor is used with the 2.5T Conlift Donut Head Clutch. The Anchor is stamped with the Conlift Logo and 2.5T WLL. These Anchors have a Safety Factor of 2.5.

CONLIFT 2.5T PLATE EDGELIFT ANCHOR



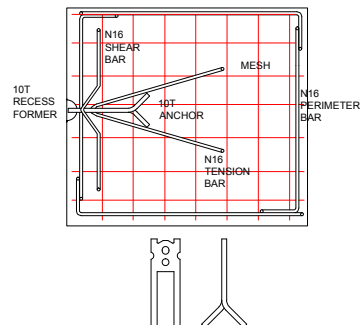
- The 5T to 7T Plate Edgelifter is installed with a re-useable orange rubber recess former fixed to the formwork. It has a N16 shear bar installed over the edge of the Anchor, parallel to the top edge. If shear force is exerted in both directions, the Anchor will require a shear bar across both edges, one in each face. It has a N16 with two 750mm legs Tension Bar placed through the lower hole in the Anchor. The Reinforcing Mesh and Perimeter Bar sit between the 2 legs of the Anchor. The Anchor, Shear Bar and Tension Bar are tied to the Reinforcing Mesh and Perimeter Bar. The Anchor is used with the 5-7T Conlift Donut Head Clutch. The Anchor is stamped with the Conlift Logo, 5-7T WLL and is painted yellow/orange. These Anchors have a Safety Factor of 2.5.

CONLIFT 5-7T PLATE EDGELIFT ANCHOR



- The 10T Plate Edgelifter is installed with a re-useable blue rubber recess former fixed to the formwork. It has a N16 shear bar installed over the edge of the Anchor, parallel to the top edge. If shear force is exerted in both directions, the Anchor will require a shear bar across both edges, one in each face. It has a N16 with two 750mm legs Tension Bar placed through the lower hole in the Anchor. The Reinforcing Mesh and Perimeter Bar sit between the 2 legs of the Anchor. The Anchor, Shear Bar and Tension Bar are tied to the Reinforcing Mesh and Perimeter Bar. The Anchor is used with the 10T Conlift Donut Head Clutch. The Anchor is stamped with the Conlift Logo, 10T WLL and is painted blue. These Anchors have a Safety Factor of 2.5.

CONLIFT 10T PLATE EDGELIFT ANCHOR



- The Oval Rubber Recess Former is placed so the long side runs along the top edge of the Panel.
- The Initial Lift off the Casting Bed or Casting Table is in Shear. The Placement Lift puts the Anchor in Tension.
- The Concrete Strength, Distance between the Anchors and the Distance from any Edge are a major factors in the Capacity of the Anchor. Please refer to the appropriate Conlift Data Sheet.

3. ROTATED EDGELIFT – 2.5T, 5-7T and 10T Plate Anchor

- The Anchor is installed as directed in the previous section.
- Anchors are placed along the long side of the Panel for Lifting and along the top of the Panel for Placement.

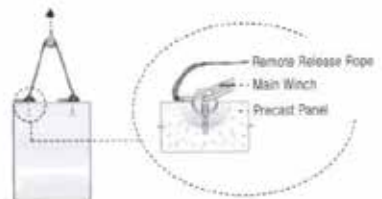
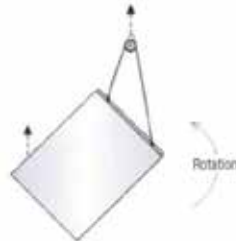
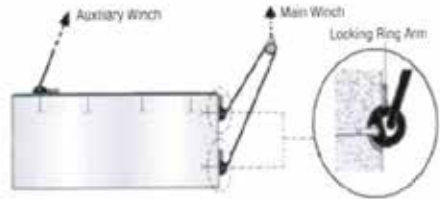
The Initial Lift off the Truck or Casting Table is in Shear. Then it is in tension when placing the panel for storage. The Rotational Lift has the force on the Tail Anchor moving from Tension to Shear and the force on the top two Anchors moving from Shear to Tension.

NOTE THE POSITION OF THE LOCKING ARM IN EACH ON EACH SLING

The auxiliary winch on the crane and the tail lifter must be able to take 75% of the panel mass. They experience the highest applied load in the initial stages of the rotation. As the panel rotates the load is initially in tension, moves through to shear and finally no load and the clutch is disengaged.

As the rotation progresses the load is transferred to the top pair of anchors. When the panel is in the vertical final position it is ready for installation.

After the panel is placed and the load removed, the clutch is disengaged by pulling the remote release rope attached to the locking arm of the clutch.



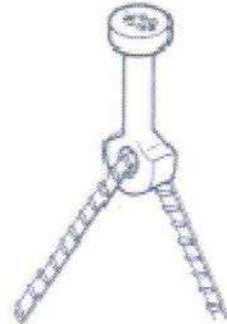
4. GENERAL LIFTING – 1.3T, 2.5T, 5T, 10T, 20T and 32T Conlift

Mushroom Head Foot and Eye Anchors

- The Mushroom Head Foot or Eye Anchor are installed with a re-usable rubber, steel or articulated steel recess former fixed to the formwork or mould. The Anchor is tied to the Panel Reinforcing and is used with the appropriate Conlift Mushroom Head Clutch.
 - The Head of the Anchor is stamped with the Conlift Logo, its WLL and its length. These Anchors have a Safety Factor of 3.
 - The correct size Rubber Recess Former is opened out and the Anchor Head containing the Logo and Sizing is placed inside. It is then attached to the formwork or mould with the threaded stud and wing-nut or the Anchor and Recess Former are “puddled” into the cast product.
- 1.3T – Blue
 - 2.5T - Yellow
 - 5T – Navy Blue
 - 10T – Yellow
 - 20T – Black
 - 32T – Black

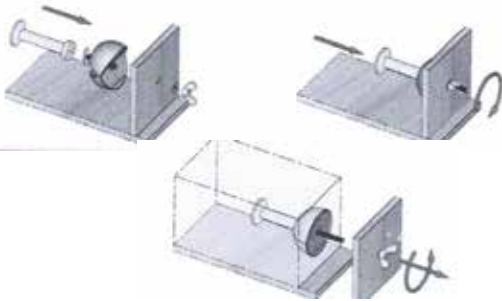
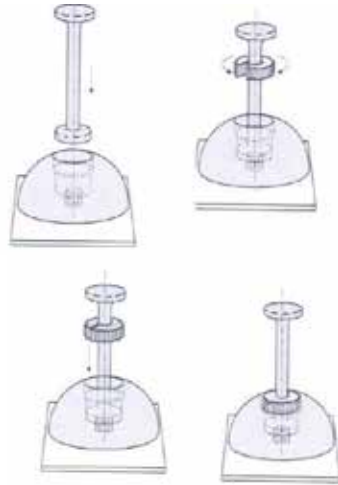


- The Anchor Head containing the Logo and Sizing is inserted into the correct size Steel Recess Former by wrapping a slit Rubber Ring around the neck of the Anchor and pushing it into the recess in the Steel Former. They are stocked in 1.3T, 2.5T and 5T.
- The Anchor Head containing the Logo and Sizing is inserted into the correct size Articulated Steel Recess Former by opening the sides of the Steel Former. They are stocked in 1.3T, 2.5T and 5T.
- Do not mistreat or weld.



STEEL RECESS FORMER

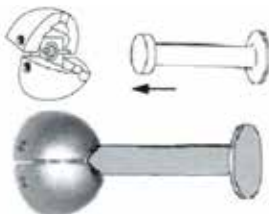
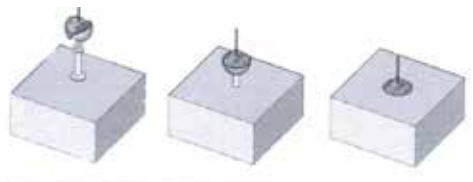
The slit Rubber Ring is placed around the throat of the Anchor. The Anchor Head is placed in the recess of the Steel Former and the rubber ring is pushed down.



RUBBER RECESS FORMER

The Recess Former comes with a threaded rod welded to a plate and a wingnut. The plates sits in the Former and the threaded rod passes out the back of the Former and through a hole in the Formwork. The wingnut is tightened to hold the Former against the Formwork. The Anchor head sits inside the opening Former.

Sometimes the Anchor and Recess Former need to be "puddled in".



ARTICULATED STEEL RECESS FORMER

The Recess Former is opened and the Anchor Head is placed in the recess and it is closed.

5. CLUTCHES



Clutches are prone to wear and tear. Ensure that clutches are inspected and verified to be in a serviceable condition before each use.

- The Conlift Clutch is stamped with the Conlift Logo, its WLL and its Batch Number. The Clutch has a Safety Factor of 5.
- The Conlift Clutch is Proof Load Tested to 2 x WLL.
- It is the users responsibility to ensure that Clutches are certified annually with a minimum requirement of 1.2 x WLL.
- Ensure that the Rigger and the Crane have the Correct Rigging complying with AS2550.
- Do not mistreat or weld or in any way subject the Clutch to any abuse or treatment likely to reduce its strength.
- Only use the specific Clutch and Anchor specified by the engineer for each Panel.

CONLIFT DONUT CLUTCH

Used with Plated Anchors in the Face-lift and Edge-lift situations.

To allow use as a Remote Release Clutch a rope is tied to the Locking Arm.

It has the Conlift Logo, the Capacity, the Product Code and the Batch Number.



CONLIFT MUSHROOM HEAD CLUTCH

Used with Foot and Eye Anchors in the Face-lift and Edge-lift situations.

It has the Conlift Logo, the Capacity, the Product Code and the Batch Number.



CONLIFT REMOTE RELEASE MUSHROOM HEAD CLUTCH

Used with Foot and Eye Anchors in the Face-lift and Edge-lift situations.

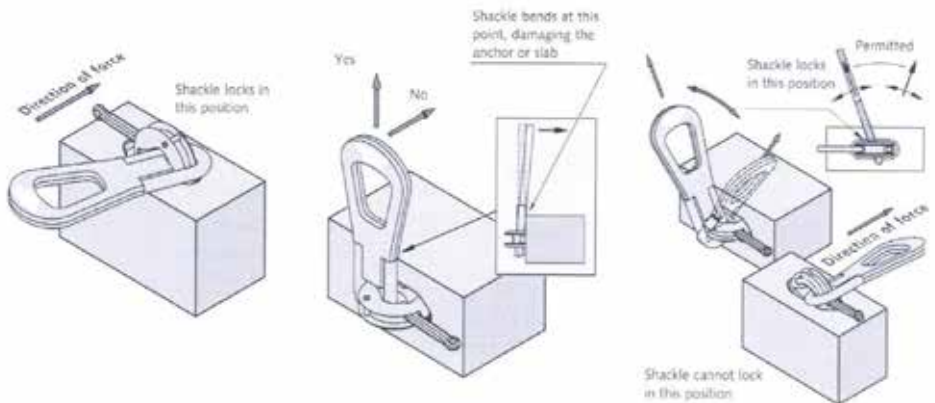
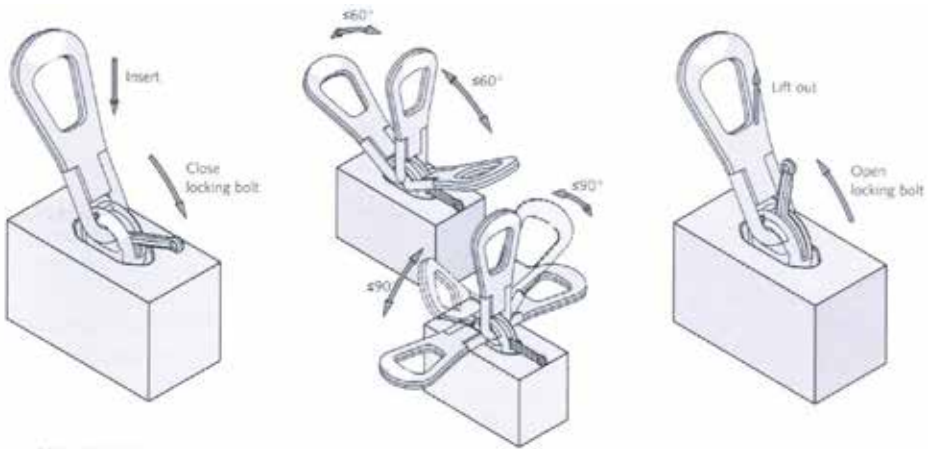
It has the Conlift Logo, the Capacity, the Product Code and the Batch Number.

To use as a Remote Release Clutch an extension is welded to the rotating head and the rope is tied to this extension.



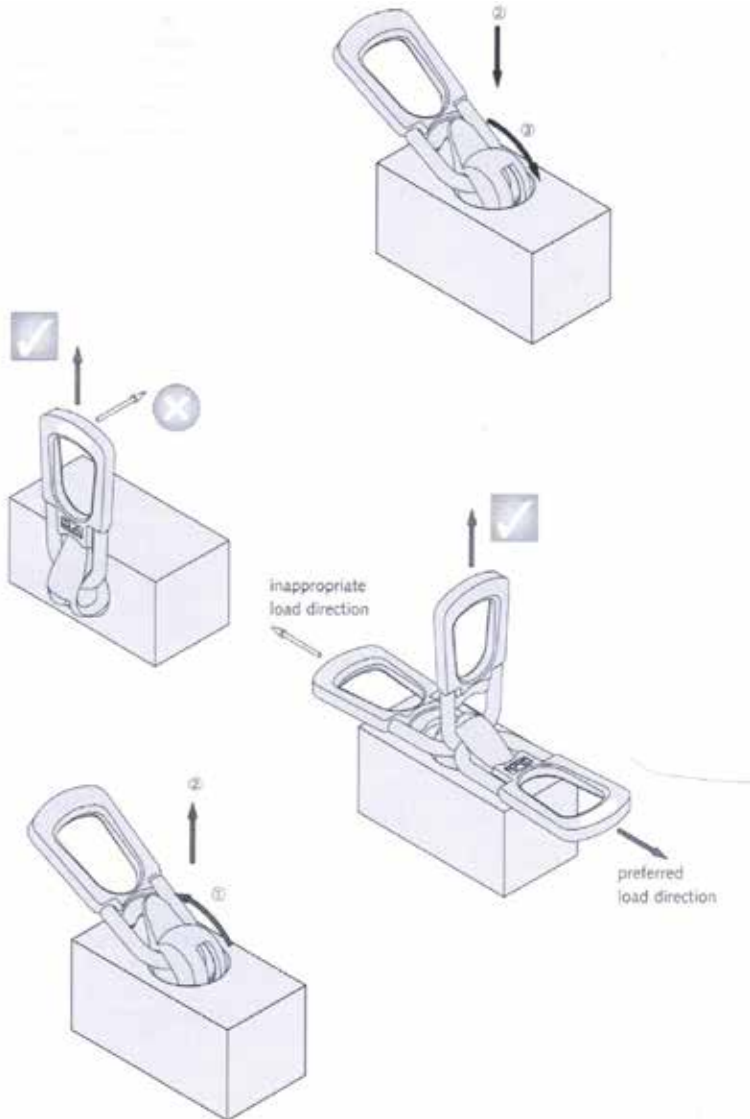
CONLIFT DONUT CLUTCH INSTALLATION AND CORRECT LIFT DIRECTION

Place Head into the void and close the Locking Arm.



CONLIFT MUSHROOM CLUTCH INSTALLATION AND CORRECT LIFT DIRECTION

Rotate the slot in the Clutch into the void and over the head of the Anchor until the tab on the Clutch rests on the concrete.



STRIPPING

When the formwork is removed from the panel the anchors need to be uncovered so that the Clutch can be attached.

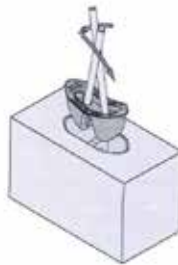
Plate or Foot Anchor Conlift Face-lifter Unit

Hammer a screwdriver into the plastic Recess Former closer to the end and lift off the Former. Repeat at the other end.



Conlift Edge-Lifter

To remove the Recess Former 2 rebars are inserted into the holes in the back of the Former. They are pushed to cross over opening of the Former to release the Anchor head.

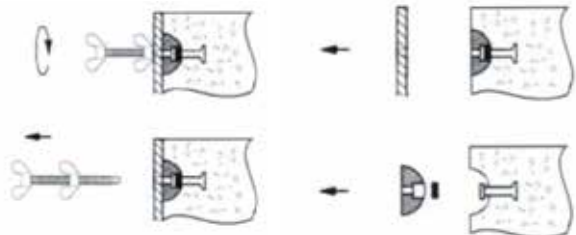


Conlift Foot or Eye Anchors

To remove the Round Rubber Recess Former 2 rebars are inserted into the holes in the back of the Former. They are pushed to cross over opening of the Former to release the Anchor head.



To remove the Round Steel Recess pull hard to remove the Former. The slit Rubber Ring will let go of the Former the Anchor head.

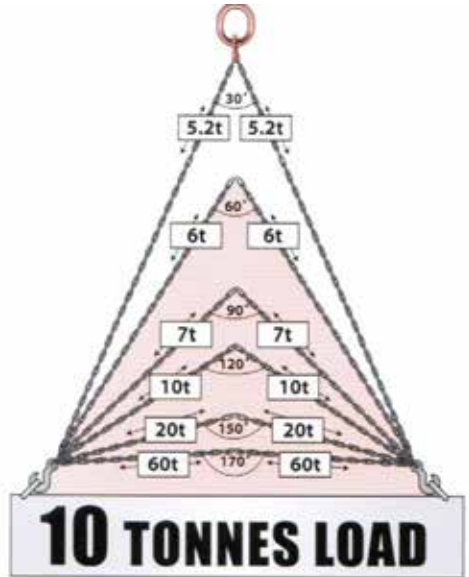


RIGGING



Incorrect rigging angles may result in anchor failure.

- It is recommended that the Sling angle be kept under 60 degrees.
- Longer Slings decrease the load on the anchor.
- The Slings must be even to produce balanced loads.



Never make sling length shorter than the distance between two anchors.

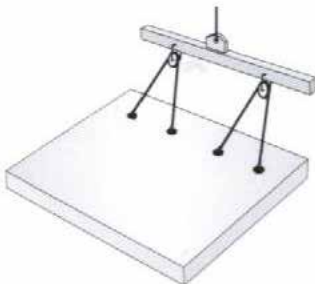
COMMON RIGGING CONFIGURATIONS



1. Spreader beam as above.



2. Using a triangular spreader beam with shackles and two sets of chains will ensure legs are equally loaded.



3. Using a spreader beam with two rolling blocks to ensure equal loading.

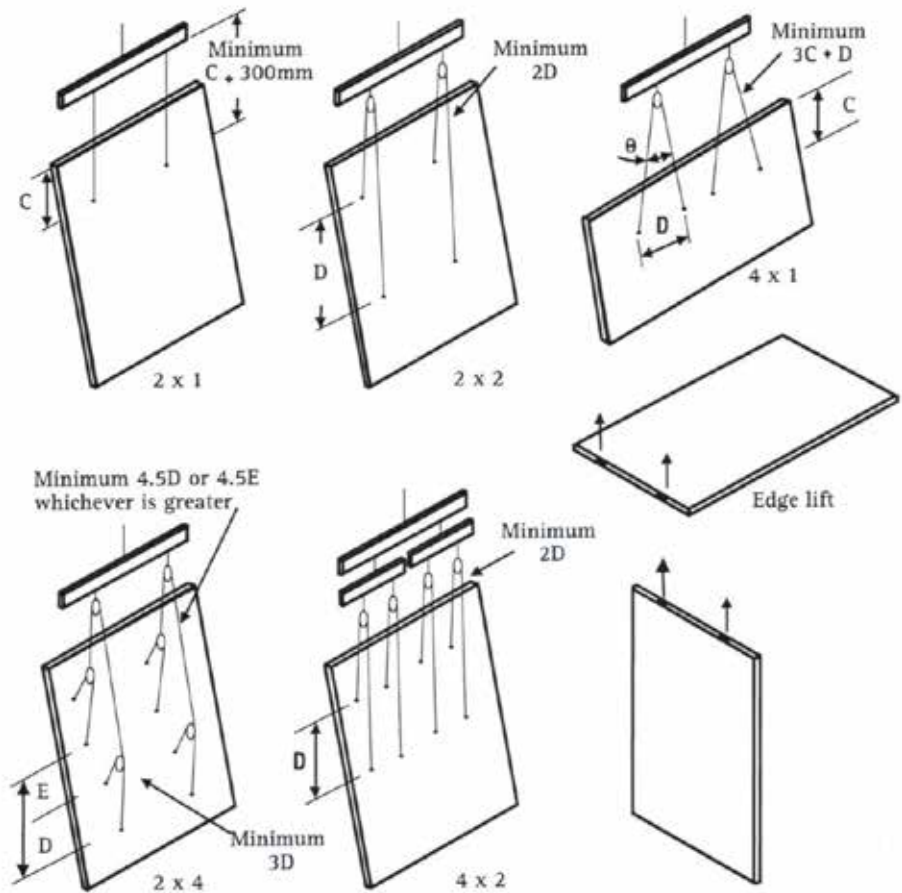


Diagram 10 – Common rigging configurations.

NOTES:

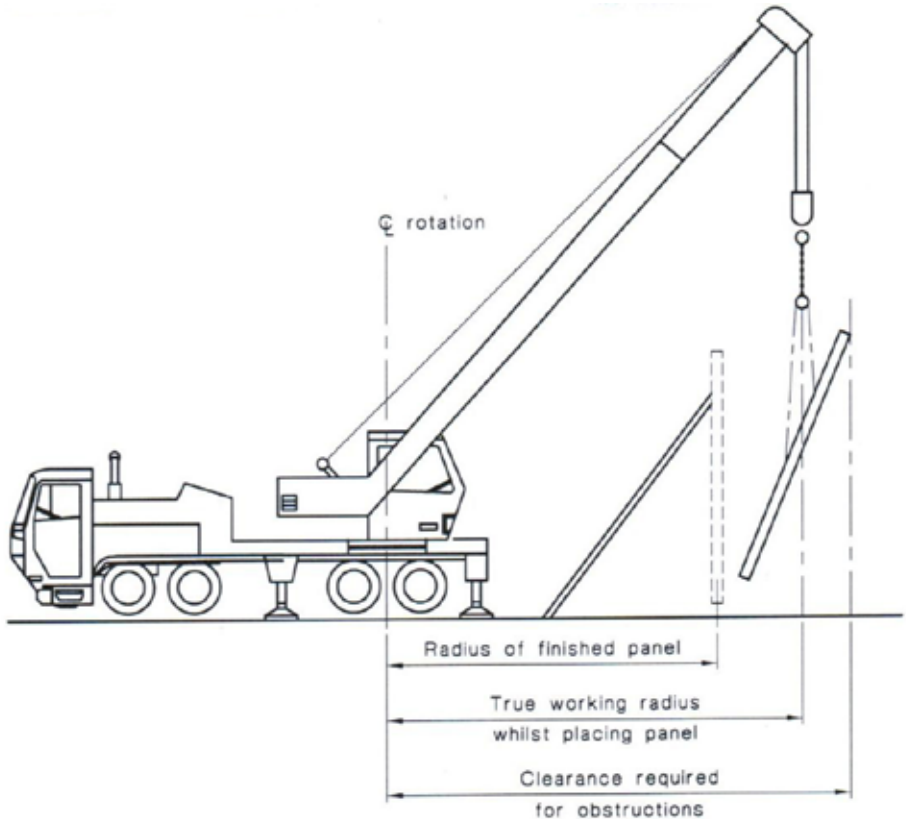
- 1) Dimensions on slings are total length through pulley
- 2) The lifting insert supplier may specify a maximum value for this angle

LIFTING



Lifting concrete panels is a high risk activity.

- The Crane must have the capacity to lift the Total Load and place the Panel at the required radius.
- The Crane must be placed to allow for clearance and true working radius. Especially important in a face lift.
- The Crane should be placed so that the operator can see the Rigging at all times. Except in the placement of the last Panel in a building. This is called a “Blind” lift.
- Braces are attached to the Panel before the lift.
- The Crane should take up the slack of the rig and slowly increase the lifting force until the applied load on the anchor is only slightly more than the load needed to lift the Panel. This force should be applied smoothly. If needed Panel Bars or Wedges can be used to help the Panels to release.
- **When placing the Panels care must be taken to avoid excessive swinging, already placed panels, braces, power lines and other machinery.**
- Always maintain and enforce a clearly marked isolation zone around the lifting area in accordance with national and state codes of practice.



STRONGBACKS

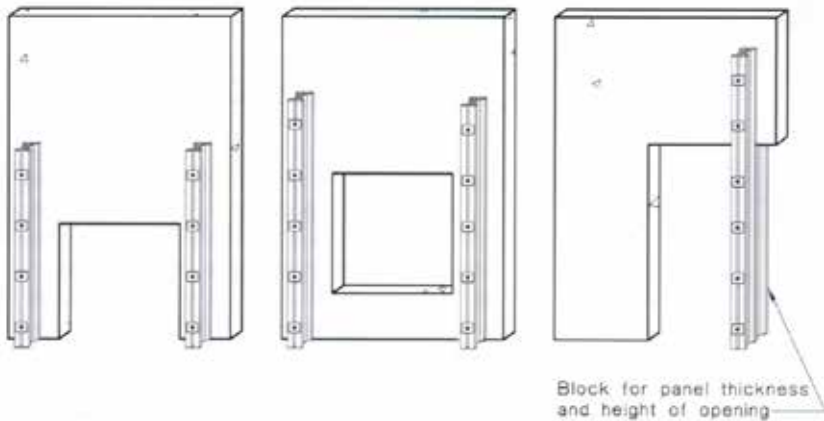
These Steel Panel Supports must meet with the requirements of AS3850-2003

The Strongbacks are used to:

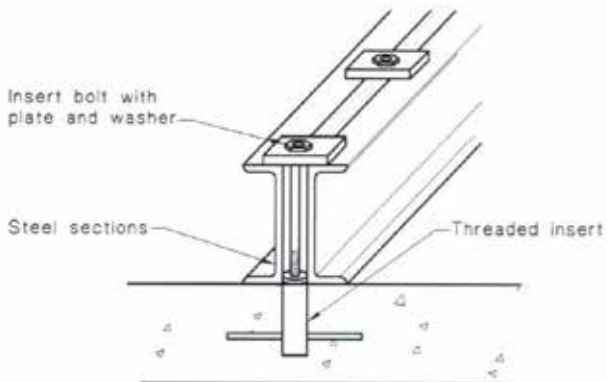
- Increase the panel stiffness and reduce stresses on the panel.
- Provide a leg for balance where there is a corner opening.
- Reduce stresses caused in thin legs or thin sides of an opening.

Attached with 8.8 grade Bolts and Ferrules, spacing as per Engineering Design Size and Length and Location as specified by the Engineer.

Remove with care – considering existing erected panels, existing attached braces, people and the crane.



(a) Examples of strongback applications



BRACING



Incorrect bracing can result in panels falling.

- Ensure that all Braces meet with the requirements of AS4100, AS3828-1998 & AS3850-2003.
- Each Brace has a certified capacity at each of its extensions.
- Each Brace is properly maintained between each use.
- Each Brace is identified with:
 - Manufacturer
 - Model / Size
 - WLL at each extension

Engineers Design must provide the appropriate Brace Selection.

Where possible two Braces per panel, braced at 90° to the Panel face (See figure 11 on page 19). The Braces must be attached to the Panel before it is lifted off the casting bed or off the truck.

Installing a Brace

- The Brace is attached to panel before lift with Grade 8.8 Bolt and Standard Ferrule or Grade 8.8 Coil Bolt and Coil Ferrule.
- The Brace is kept under control during the lift with ropes or brace dolly.
- It is attached to the base connection with appropriate fixings.
- The Brace is held at the correct extension with a lockable shear pin.
- Fine adjustment is made by rotating the Brace Thread to keep the Panel vertical.
- The Brace Foot is fixed in line with the Brace so that it does not slew and release the Panel.

Check the Brace Base fixing shortly after Panel erection to ensure that it remains at the correct torque. Regularly check all Brace connections.

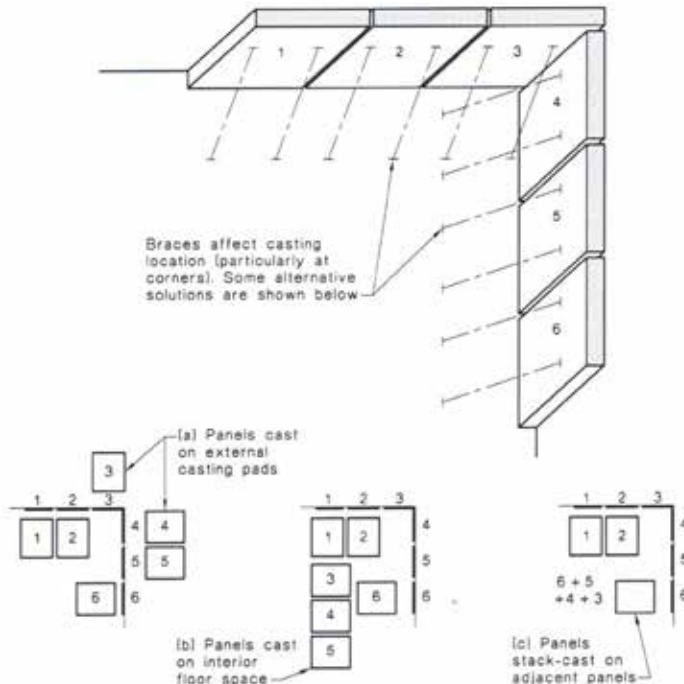
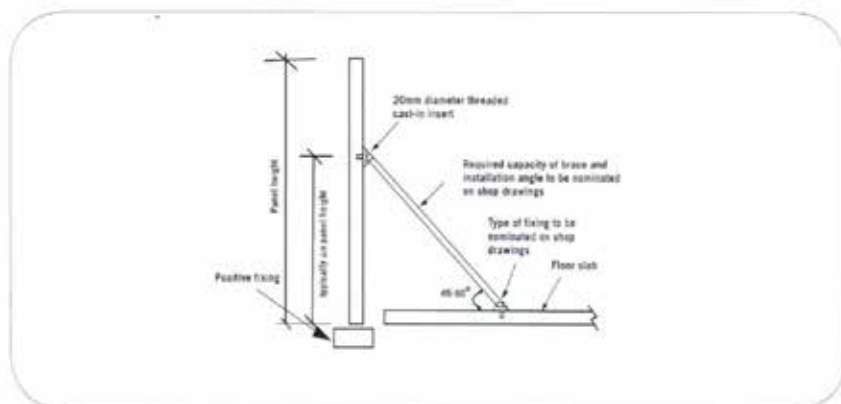
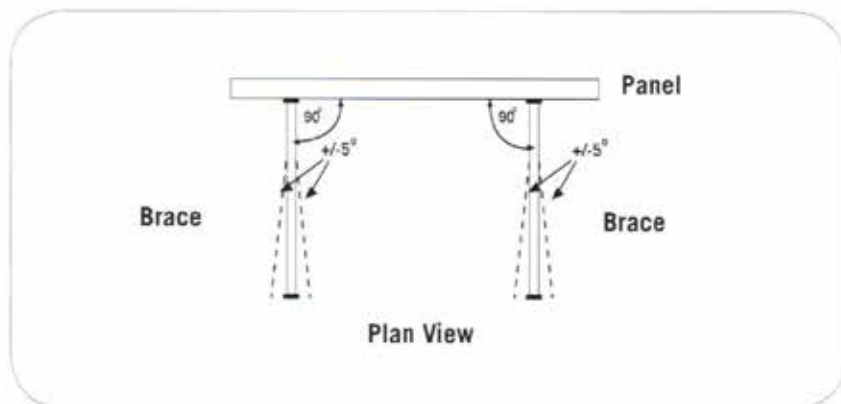


Figure 10. Concrete panel bracing, preferred arrangement



Bracing must be installed perpendicular to the concrete panel in the plan (Figure 11). Skewed braces greater than ± 5 degrees to perpendicular will reduce concrete panel stability. The design and installation of skewed braces will need to be carefully reviewed to consider any induced lateral and torsional forces to the panel.

Figure 11. Concrete panel bracing



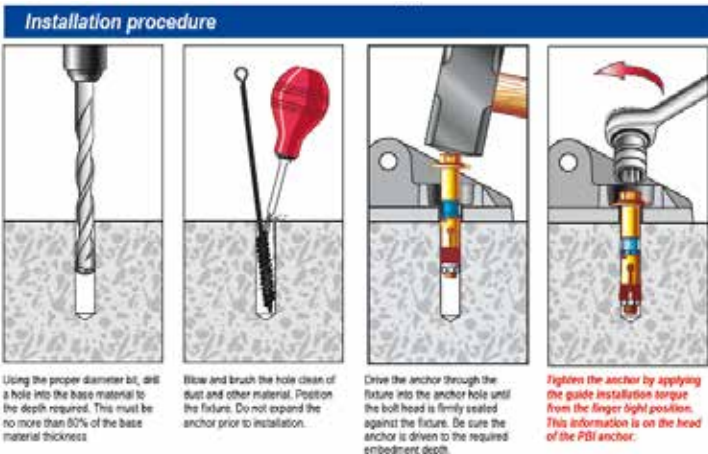
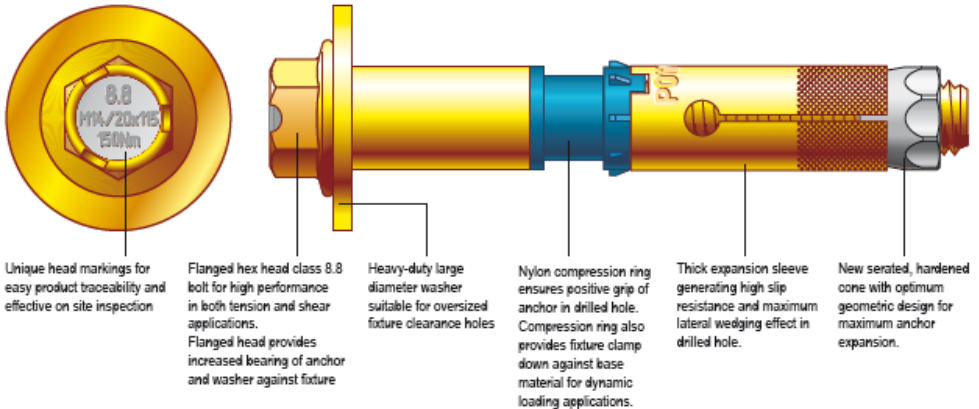
POWERS PBI BRACE-IT ANCHOR INSTALLATION

The PBI Anchor is a high load, low slip expansion anchor that has been tested in accordance with AS3850-2003. It is ideally suited to the needs of the Tilt-up and Precast Construction Industry. To attain the anchor's full capacity the manufacturer's Technical Data Guide must be understood and followed.

NEW POWERS PBI BRACE-IT ANCHOR

The NEW PBI anchor is a high performance load (torque) controlled, thick sleeve expansion anchor, which is designed for bracing of precast and tilt-up concrete panels. The NEW high performance PBI is a high load/low slip expansion anchor which has been tested in accordance with AS3850-2003, Appendix A8.2 (Tilt-up concrete construction standard). AS 3850-2003 clause 2.4.3 (iii) Bracing Inserts stipulates that where expansion anchors are to be used as brace fixing inserts they shall be of the load controlled type and the WLL (Working Load Limit) shall be limited to 0.65 of the first slip load (residual preload) in accordance with Appendix A8.2. AS 3850 - 2003 BRACE FIXING COMPLIANCE REQUIREMENT.

Appendix A8.2 of AS3850 - 2003 requires the WLL (Working Load Limit) of a brace fixing to be determined by first measuring the residual preload in tension 14 days after setting into 20MPa concrete.



Anchor sizes for bracing only

Part No	Description	Drill Ø mm	Depth mm	Fixture thickness mm	Installation Torque Nm	Box qty	Carton qty
PBI18-20/115	M12 x 115mm	18	95	20	90	25	75
PBI20-20/115	M14 x 115mm	20	95		150	10	40

Load controlled expansion anchors for brace fixing.
Tested in accordance with AS3850 - 2003 (Appendix A8.2)

M12 / Ø 18 - PBI Specification Data

Product	PBI Powers BRACE-IT	
Part number	PBI 18-20/115	
Sizes	18 x 115mm	
Bolt	M12 (class 8.8)	
Drill diameter	18mm	
Embedment depth	95mm	
Anchor spacing	180mm (nominal)	
Anchor edge distance	216mm (nominal)	
Fixture thickness	20mm (nominal)	
Fixture clearance hole	20 to 22mm	
Tightening torque	90Nm	

Performance in 20MPa concrete

Tension	First slip load (0.1mm)	24.5kN
	R_{WLL} (0.65 x First Slip Load):	15.9kN
Shear	$R_{(S)A}$ Anchor Allowable Working Load:	23.1kN

M14 / Ø 20 - PBI Specification Data

Product	PBI Powers BRACE-IT	
Part number	PBI 20-20/115	
Sizes	20 x 115mm	
Bolt	M14 (class 8.8)	
Drill diameter	20mm	
Embedment depth	95mm	
Anchor spacing	200mm (nominal)	
Anchor edge distance	240mm (nominal)	
Fixture thickness	20mm (nominal)	
Fixture clearance hole	22 to 24mm	
Tightening torque	150Nm	

Performance in 20MPa concrete

Tension	First slip load (0.1mm)	35.6kN
	R_{WLL} (0.65 x First Slip Load):	23.1kN
Shear	$R_{(S)A}$ Anchor Allowable Working Load:	28.0kN

Material specifications

Anchor components	Carbon Steel
Bolt	Class 8.8 (UTS = 800 MPa min. / Y.S. = 640MPa min.)
Washer	C1040 (heat treated)
Expander sleeve	C1022
Extension sleeve	C1022
Expander cone	C1040 (heat treated) + Proprietary coating
Compression ring	Nylon
Plating	Zinc plated in accordance with AS1789-2003
Head style	Heavy Hex Flange Head M12 / O.D. = 26.5mm M14 / O.D. = 30.5mm
Socket size	M12 / 18 = 18mm socket M14 / 20 = 21mm socket

Combined loading

Anchors loaded in both Tension & Shear shall be designed to satisfy -

$$\left(\frac{F_{(T)S.W.L.}}{R_{WLL}} \right)^{5/3} + \left(\frac{F_{(S)S.W.L.}}{R_{(S)A}} \right)^{5/3} \leq 1$$

Where: $F_{(T)S.W.L.}$ = Applied service load (tension)
 R_{WLL} = 0.65 x First Slip Load (tension)
 $F_{(S)S.W.L.}$ = Applied service load (shear)
 $R_{(S)A}$ = Anchor allowable working load (shear)

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Conlift Concrete Lifting Systems

Safety and Installation Manual