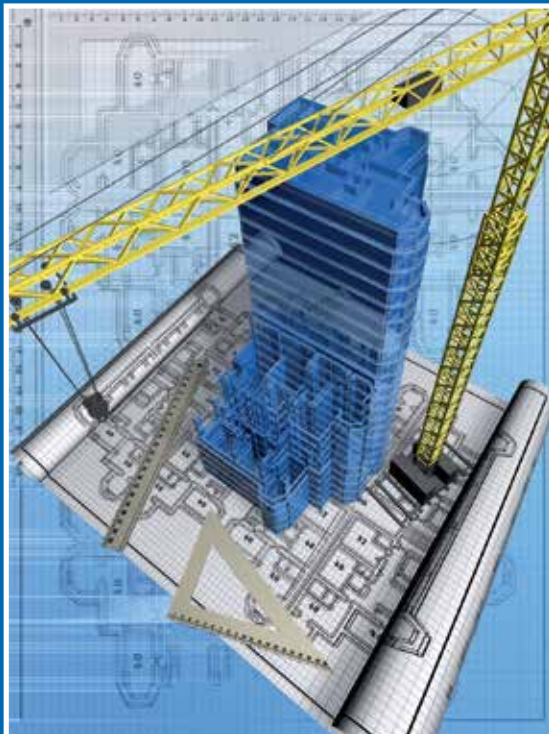


# Edgelift Design Manual



## INTRODUCTION

This publication is a design manual to be used in conjunction with concrete engineering principles. The design data included in this Technical Data Sheet relates to a variety of applications for Conlift EA25, EA57 and EA10 Edgelift Anchors. This information is provided for the assistance of appropriately qualified professionals in the preparation of lifting design specifications for concrete panels and concrete precast elements.

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.

## IMPORTANT NOTE

This booklet was issued in November 2012 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](http://www.parchem.com.au)

The information in this manual should be read in conjunction with the other 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 or liability for an injury, damage, cost, expense or claim whatsoever suffered by any person resulting either directly or indirectly a from failure to install the Conlift Precast and Tilt Up products in accordance with these installation instructions.

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## CONLIFT EDGELIFT ANCHOR

- Conlift Edgelift Anchors are supplied in a range that will suit common industry working load limits (WWL).
- The Conlift Edgelift Anchors are tested in accordance with AS3850-2003 and exceed the requirements of the standards.
- The designed safety factor of each anchor is 2.5 x the working load limit (WLL).
- Each Conlift Edgelift Anchor is clearly marked with the Conlift brand identification for traceability and is marked with the working load limit (WLL) to ensure the correct anchor is used for the applicable load.
- All Conlift Edgelift Anchors are galvanised (hot dipped) to ensure they are resistant to atmospheric corrosion.

## INSTALLATION OF CONLIFT EDGE-LIFT ANCHORS

### How to install

Engineers specify the appropriate components according to the loads, type of panel or element and handling methods.

Choose a recess former to suit the casting process.

Coat the mould and the recess former with release agent.

Insert the Conlift Plate Edgelift Anchor into the recess former.

Insert the Tension Bar through the Anchor.

Attach the recess former centrally and level to the mould.

Place the perimeter bar and the mesh between the two legs.

Place the Shear bar over the edge of the anchor in the notch of the face that will lifted first.

Place the Shear bar over the edge of the anchor in the notch of the opposite face if there is two directional lift.

Tie Shear and Tension Bar, Anchor, Mesh and Perimeter Bar together.

Cast and cure the panel to the minimum strength required for lifting (normally 15MPa).

Strip the Edgeform and recess formers to expose the head of the anchor.

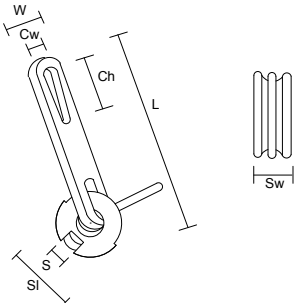
Attach the correct WLL lifting clutch:

- Pull the locking arm back to open the clutch.
- Slide the open clutch over the anchor head.
- Rotating the locking arm so that the pin slides through the hole in the anchor and the locking arm comes to rest against the concrete.

Hoist slowly, removing the panel from the bed, avoiding impacts.

## CLUTCHES

### Dimensions and WLL

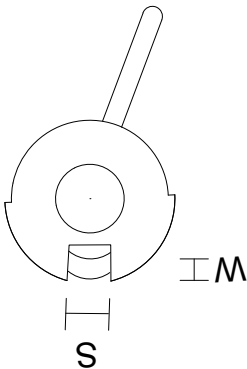


	LEDC25	LEDC57	LEDC10
L	264	310	402
W	93	114	140
Ch	65	85	110
Cw	55	65	80
Sw	25	36	50
SI	80	103	150
Handle Plate	14	20	23
Ring	12	16	18
WLL T 0° Sling Angle	2.5	9	10
WLL kN Annual Proof load	29	106	117
WLL T Annual Proof load	3	10.8	12
Nominal WLL Anchor	2.5	8	10

### Inspection and Testing

Although Conlift Clutches are durable; they should be inspected before each lift to ensure that there are no signs of fatigue, distortion and/or damage. Once every six months, the slot width must be checked to ensure that it does not exceed the Max stated in the table below.

As stated in AS3850 each clutch must be proof load tested annually to 1.2 x Working Load Limit.



Size	S	S max	M min
2.5	14	17	12
5 to 7	18	19	16
10	23	27	18

### Rigging inspection and Testing

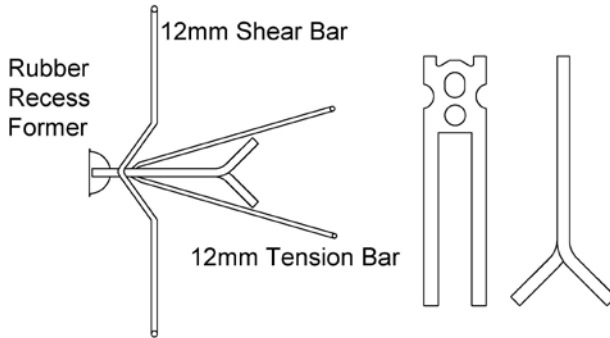
As rigging can become worn due to wear and tear, it should be inspected before every lift for damage. All rigging must be tagged and tested as per the Australian rigging standard.

## CONLIFT EDGE-LIFT ANCHORS-DIMENSIONS, WORKING LOAD LIMITS

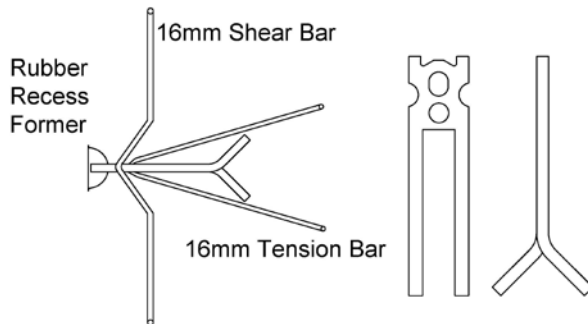
- Hot dipped galvanized to Australian Standard is AS4680-1999
- Coating thickness -Not Spun and  $\geq 6\text{mm}$  - 70 to 85 microns 600gm per square metre. Galvanizing meets the ASTM123 Standard.
- Forged from high impact strength construction Steel Q345B
- Tensile Strength 590MPa. Yield Strength 350 to 380MPa Precision to Grade B of the Standard GB/T1591 and JIS G3106.
- Genuine Conlift Edgelift Anchors are stamped with the Anchor strength WLL and they are painted for ease of identification after installation.
- EA25 – Galvanized    EA57 – Yellow    EA10 - Blue
- Anchors exceed the requirements of AS3850-2003.

Anchor	Length	Width	Thickness	WLL	Accessories	Code
EA25	200	50	10	2.5t	Rubber Recess Former 2.5T Backing Plate 2.5T Clutch 2.5T Shear Bar 2.5T	RFRE25 RFBP25 LEDC25 SBBN12
				3.7t	Tension Bar 2.5T	TBBN12500
EA57	267	63	16	5-7t	Rubber Recess Former 5-7T Backing Plate 5-7T Clutch 5-7T Shear Bar 5-7T	RFRE57 RFBP57 LEDC57 SBBN16
				8.7t	Tension Bar N16	TBBN16750
				9.7t	Tension Bar N20	TBBN20750
EA10	290	95	16	10t	Rubber Recess Former 10T Backing Plate 10T Clutch 10T Shear Bar 10T Tension Bar 10T	RFRE10 RFRE10 LEDC10 SBBN16 TBBN16750

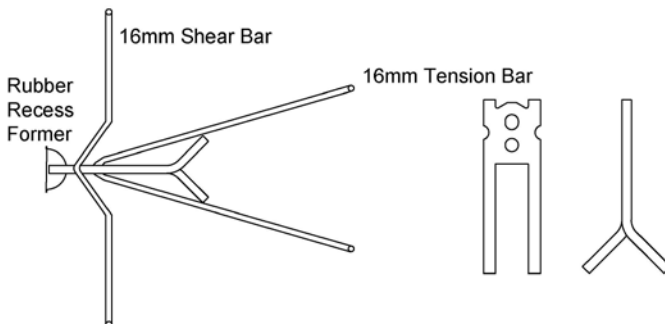
### CONLIFT EA25 PLATE EDGELIFT ANCHOR



### CONLIFT EA57 PLATE EDGELIFT ANCHOR



### CONLIFT EA10 PLATE EDGELIFT ANCHOR



## RECESS FORMERS AND BACKING PLATE

- Recess formers are used to set anchors at the correct height & create a recess within concrete element.
- Recess formers are non-interchangeable with other load rated anchors.
- Available in flexible rubber.
- A backing plate can be used to fix the recess former to the sideform





## CONLIFT EA25 PLATE EDGELIFT ANCHOR WLL (t)

Panel Thickness (mm)	Direction of Force	Reinforced / Unreinforced	Placement of Anchor	Concrete Strength at Lift (Mpa) WLL (t)					
				10	15	20	25	32	40
100	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	2.0	2.4	2.5	2.5	2.5	2.5
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	0.9	1.0	1.2	1.3	1.3	1.5
125	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	2.0	2.4	2.5	2.5	2.5	2.5
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	0.9	1.0	1.2	1.3	1.3	1.5
150	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	2.0	2.4	2.5	2.5	2.5	2.5
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	0.9	1.0	1.2	1.3	1.3	1.5
175	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	2.0	2.5	2.5	2.5	2.5	2.5
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter	0.9	1.0	1.2	1.3	1.3	1.5

**Values displayed at the measured Working Load Limit (WLL) in tonnes (t) with safety Factor of 2.5 (refer AS3850-2003 Tiltup Concrete Construction)**

**Panel Reinforcement:** Minimum assumed is SL82 Mesh and N16 centrally placed perimeter bar.

**Shear Bar:** N12 bar is bent and placed over the edge of the anchor, assuming 25mm of cover. It is placed over the edge of the anchor closest to the front face of the lift. The design of this Shear Bar is attached.

**Minimum Distance:** for minimum designed edge distances and distances between anchors, **see table 1, page 18.**

Performance must be re-evaluated with dimensions below these minimum values. **(See page 19).**

## CONLIFT EA25 PLATE EDGELIFT ANCHOR WITH TENSION BAR WLL (t)

Panel Thickness (mm)	Direction of Force	Reinforced / Unreinforced	Placement of Anchor	Concrete Strength at Lift (Mpa) WLL (t)					
				10	15	20	25	32	40
100	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	2.0	2.4	2.5	2.5	2.5	2.5
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	0.9	1.0	1.2	1.3	1.3	1.5
125	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	2.0	2.4	2.8	3.1	3.5	3.7
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	0.9	1.0	1.2	1.3	1.3	1.5
150	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	2.0	2.4	2.8	3.1	3.5	3.7
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	0.9	1.0	1.2	1.3	1.3	1.5
175	Tension	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	2.0	2.5	2.8	3.1	3.5	3.7
	Shear	With Panel Reinforcing	With N12 Shear Bar SL82 and N16 Perimeter N12 Tension Bar	0.9	1.0	1.2	1.3	1.3	1.5

*(Highlighted Values - Limited to withstand spalling around the void)*

Values displayed at the measured Working Load Limit (WLL) in tonnes (t) with safety Factor of 2.5 (refer AS3850-2003 Tiltup Concrete Construction)

**Panel Reinforcement:** Minimum assumed is SL82 Mesh and N16 centrally placed perimeter bar.

**Shear Bar:** N12 bar is bent and placed over the edge of the anchor, assuming 25mm of cover. It is placed over the edge of the anchor closest to the front face of the lift. The design of this Shear Bar is attached.

**Tension Bar:** N12 bar is bent and placed through the second anchor hole. It is placed centrally in the panel. The design of this Tension Bar is attached.

**Minimum Distance:** for minimum designed edge distances and distances between anchors, see table 1, page 18.

Performance must be re-evaluated with dimensions below these minimum values. (See page 19).

## CONLIFT EA57 PLATE EDGELIFT ANCHOR WLL (t)

Panel Thickness (mm)	Direction of Force	Reinforced / Unreinforced	Placement of Anchor	Concrete Strength at Lift (Mpa) WLL (t)					
				10	15	20	25	32	40
100			NOT RECOMMENDED						
125	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	4.7	5.5	6.5	7.0	7.0	7.0
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	1.8	2.1	2.3	2.5	2.8	2.9
150	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	4.7	5.5	6.5	7.0	7.0	7.0
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	2.0	2.2	2.5	2.7	2.8	3.0
175	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	4.7	5.5	6.5	7.0	7.0	7.0
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	2.3	2.5	2.6	2.9	3.0	3.0
200	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	4.7	5.5	6.5	7.0	7.0	7.0
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter	2.4	2.6	2.8	3.0	3.0	3.0

*(Highlighted Values - Limited to withstand spalling around the void)*

**Values displayed at the measured Working Load Limit (WLL) in tonnes (t) with safety Factor of 2.5 (refer AS3850-2003 Tiltup Concrete Construction)**

**Panel Reinforcement:** Minimum assumed is SL82 Mesh and N16 centrally placed perimeter bar.

**Shear Bar:** N16 bar is bent and placed over the edge of the anchor, assuming 25mm of the cover. It is placed over the edge of the anchor closest to the front face of the lift. The design of this Shear Bar is attached.

**Minimum Distance:** for minimum designed edge distances and distances between anchors, **see table 1, page 18**. Performance must be re-evaluated with dimensions below these minimum values. **(See page 19)**.

## CONLIFT EA57 PLATE EDGELIFT WITH TENSION BAR WLL (t)

Panel Thickness (mm)	Direction of Force	Reinforced / Unreinforced	Placement of Anchor	Concrete Strength at Lift (Mpa) WLL (t)					
				10	15	20	25	32	40
100			NOT RECOMMENDED						
125	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 Tension Bars N20 Tension Bars	4.7 5.3	5.6 6.3	6.5 7.3	7.3 8.1	8.3 9.3	8.7 9.7
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 or N20 Tension Bars	1.8	2.1	2.3	2.5	2.8	2.9
150	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 Tension Bars N20 Tension Bars	4.7 5.3	5.6 6.3	6.5 7.3	7.3 8.1	8.3 9.3	8.7 9.7
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 or N20 Tension Bars	2.0	2.2	2.5	2.7	2.8	3.0
175	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 Tension Bars N20 Tension Bars	4.7 5.3	5.6 6.3	6.5 7.3	7.3 8.1	8.3 9.3	8.7 9.7
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 or N20 Tension Bars	2.3	2.5	2.6	2.9	3.0	3.0
200	Tension	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 Tension Bars N20 Tension Bars	4.7 5.3	5.6 6.3	6.5 7.3	7.3 8.1	8.3 9.3	8.7 9.7
	Shear	With Panel Reinforcing	With N16 Shear Bar SL82 and N16 Perimeter N16 or N20 Tension Bars	2.4	2.6	2.8	3.0	3.0	3.0

**(Highlighted Values - Limited to withstand spalling around the void)**

**Values displayed at the measured Working Load Limit (WLL) in tonnes (t) with safety Factor of 2.5 (refer AS3850-2003 Tiltup Concrete Construction)**

**Panel Reinforcement:** Minimum assumed is SL82 Mesh and N16 centrally placed perimeter bar.

**Shear Bar:** N16 bar is bent and placed through the second anchor hole.

It is placed centrally in the panel. The design of this Tension Bar is attached.

**Tension Bar:** N16 or N20 bar is bent and placed through the second anchor hole. It is placed centrally in the panel. The design of this Tension Bar is attached.

**Minimum Distance:** for minimum designed edge distances and distances between anchors, see table 1, page 18. Performance must be re-evaluated with dimensions below these minimum values. (See page 19).

## CONLIFT EA10 PLATE EDGELIFT ANCHOR WLL (t)

Panel Thickness (mm)	Direction of Force	Reinforced / Unreinforced	Placement of Anchor	Concrete Strength at Lift (Mpa) WLL (t)					
				10	15	20	25	32	40
100			NOT RECOMMENDED						
125			RATED BUT NOT RECOMMENDED						
150	Tension	With Panel Reinforcing	With N16 Shear Bar N16 Tension Bar SL82 and N16 Perimeter	7.4	8.8	10	10	10	10
	Shear	With Panel Reinforcing	With N16 Shear Bar N16 Tension Bar SL82 and N16 Perimeter	1.9	2.2	2.5	2.7	3	3.3
175	Tension	With Panel Reinforcing	With N16 Shear Bar N16 Tension Bar SL82 and N16 Perimeter	8	9.5	10	10	10	10
	Shear	With Panel Reinforcing	With N16 Shear Bar N16 Tension Bar SL82 and N16 Perimeter	2.2	2.4	2.7	2.9	3.1	3.4
200	Tension	With Panel Reinforcing	With N16 Shear Bar N16 Tension Bar SL82 and N16 Perimeter	8	9.5	10	10	10	10
	Shear	With Panel Reinforcing	With N16 Shear Bar N16 Tension Bar SL82 and N16 Perimeter	2.4	2.6	2.8	3.0	3.2	3.5

*(Highlighted Values - Limited to withstand spalling around the void)*

Values displayed at the measured Working Load Limit (WLL) in tonnes (t) with safety Factor of 2.5 (refer AS3850-2003 Tiltup Concrete Construction)

**Panel Reinforcement:** Minimum assumed is SL82 Mesh and N16 centrally placed perimeter bar.

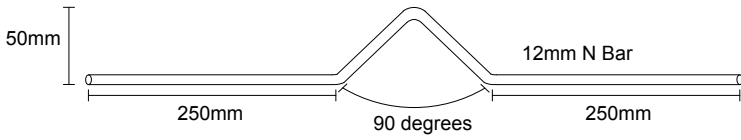
**Shear Bar:** N16 Bar is bent and placed over the edge of the anchor, assuming 25mm of cover. It is placed over the edge of the anchor closest to the front face of the lift.

The design of this Shear Bar is attached.

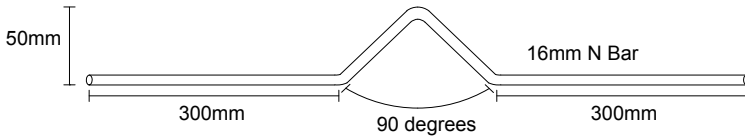
**Tension Bar:** N16 Bar is bent and placed through the bottom hole of the anchor and passing down into the panel. The design of the Tension Bar is attached.

**Minimum Distance:** for minimum designed edge distances and distances between anchors, see table 1, page 18. Performance must be re-evaluated with dimensions below these minimum values. (See page 19).

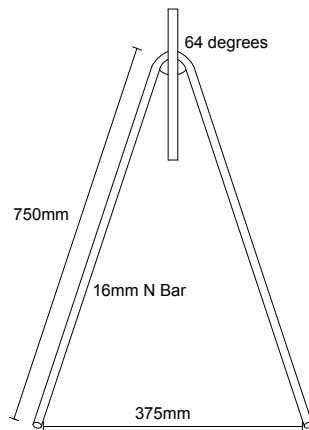
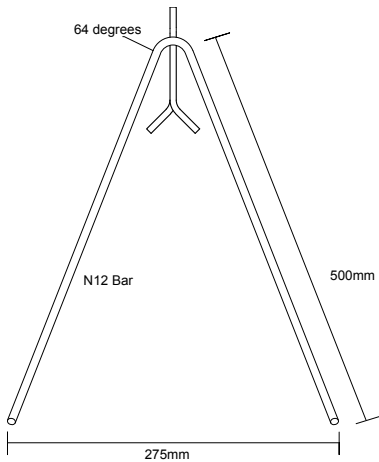
### N12 Shear Bar



### N16 Shear Bar



### Tension Bar



## DESIGN CONSIDERATIONS FOR CONCRETE LIFTING SYSTEMS

The design engineer must take into account all limit states and failure mechanisms.

The following limit states are to be considered during the design process.

Guidance and recommendations can be found in AS3600 (Concrete structures) and AS1170 (Structural Design Actions)

- Anchor strength
- Concrete strength
- Combined anchor strength
- If a tension bar is to be installed with the anchor, their joint capacity must be considered.
- Design for concrete strength
- Serviceability
- Anchor robustness and flexibility
- Fatigue due to multiple lifting and corrosion
- Provided the Conlift anchor is showing no signs of corrosion or damage they are safe for multiple lifts.
- Atmospheric Corrosion

All Conlift Edgelift Anchors are galvanised (hot dipped) to ensure they are resistant to atmospheric corrosion. Stainless steel anchors are available for more aggressive environments.

The lifetime of Conlift galvanised anchor coatings depends upon the category as shown below.

Atmospheric Corrosivity Zones ISO 9223:2012 and ISO 14713-1:2009	Description	Typical Environment	Corrosion rate for the first year of exposure ( $\mu\text{m}/\text{y}$ )		Typical service life (years)				
			Mild Steel	Zinc	Galvanizing thickness ( $\mu\text{m}$ ) and coating mass ( $\text{g}/\text{m}^2$ )				
					14 $\mu\text{m}$ 100 $\text{g}/\text{m}^2$	20 $\mu\text{m}$ 140 $\text{g}/\text{m}^2$	42 $\mu\text{m}$ 300 $\text{g}/\text{m}^2$	85 $\mu\text{m}$ 600 $\text{g}/\text{m}^2$	125 $\mu\text{m}$ 900 $\text{g}/\text{m}^2$
C1	Very low	Dry indoors	$\leq 1.3$	$\leq 0.1$	100+	100+	100+	100+	100+
C2	Low	Arid/Urban inland	$>1.3$ to $\leq 25$	$>0.1$ to $\leq 0.7$	21-100+	36-100+	50-100+	100+	100+
C3	Medium	Coastal or industrial	$>25$ to $\leq 50$	$>0.7$ to $\leq 2.1$	7-21	12-36	17-50	40-100+	60-100+
C4	High	Calm sea-shore	$>50$ to $\leq 80$	$>2.1$ to $\leq 4.2$	4-7	6-12	8-17	20-40	30-60
C5	Very High	Surf sea-shore	$>80$ to $\leq 200$	$>4.2$ to $\leq 8.4$	2-4	3-6	4-8	10-20	15-30
CX	Extreme	Off-shore	$>200$ to $\leq 700$	$>8.4$ to $\leq 25$	1-2	1-3	1-4	3-10	5-15

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- Note 1 This table is an extrapolation of well-established corrosion rates and is supported by case history evidence in Australia, where service life records of 50 years are common and up to 110 years are recorded. The corrosion rates are consistent with ISO 9223:2012 and ISO 14713-1:2009.
- Note 2 Because the actual galvanizing thickness applied is usually well above the specification minimum, the service lives quoted in rain exposed locations are likely to be conservative. In addition, ISO 9224:2012 applies lower corrosion rates for both steel and zinc where the object is exposed to long term steady state environmental conditions.
- Note 3 Sheltered and not rain-washed surfaces, in a marine atmospheric environment where chlorides are deposited, can experience a higher corrosivity category due to the presence of hygroscopic salts.
- Note 4 The coastal zone is defined as between 100 metres to 1 km inland from sheltered seas and between 1 km and 10 – 50 km from surf beaches depending upon prevailing winds and topography.
- Note 5 Measured corrosion rates for steel in selected locations in Australia are shown in AS 4312:2006.
- Note 6 Galvanizing thicknesses of 14  $\mu\text{m}$  (100  $\text{g}/\text{m}^2$ ) and 20  $\mu\text{m}$  (140  $\text{g}/\text{m}^2$ ) are typically applied by an in-line process.
- Note 7 A more complete description of each of the typical environments is available in ISO 9223:2012, ISO 14713-1:2009, AS 4312:2006, and from the GAA.

## Further Guidance

### Welding

As welding can cause zinc contamination and embrittlement from uncontrolled applied heat Conlift anchors are not to be welded.

### Panels Finish

Reinforce the concrete element to prevent unpermissible cracking that would require expensive patching and repair in the factory or on-site.

In certain applications, insignificant cracking and spalling may not be an issue. e.g. bridge beams, grease pits and sumps etc.

It is important to produce high quality precast concrete elements to enhance the overall aesthetics of a building.

## ENGINEERING NOTES FOR DESIGNING CONCRETE LIFTING ANCHORS WITH AS3850:2003

### To Calculate the Weight of the Element

WEIGHT = WIDTH X HIGH X THICKNESS X 2.4 with all measurements in metres  
As specified in AS3850

### To Calculate the Force of Adhesion

Select the Load Factor from the chart below as defined in AS3850 Clause 3.5.2

Design Lifting Condition	Load Factor	AS3850 Requirement
Lifting from smooth, oiled steel moulds and casting beds, handling and erection with a crane	1.2	1.2
Lifting from concrete casting beds, e.g: site-cast tilt up.	1.5	1.5
Lifting deep ribbed panels or objects where high suction and adhesion loads can be generated.	2	-
Lifting from moulds without removable side forms	3	-
Travelling over rough ground whilst suspended	4 → 5	-

TOTAL LOAD = WEIGHT X LOAD FACTOR



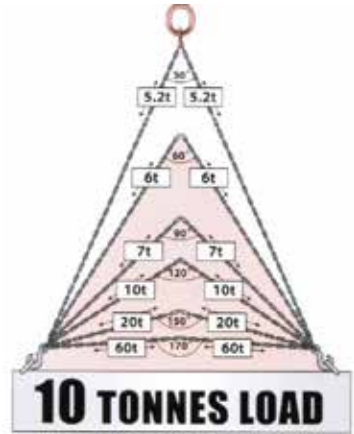
### To Select the Number of Lifting Positions

Establish the required number of anchors to ensure that the stresses from lifting do not exceed the strength of the concrete element being lifted.

### To Select the Rigging and Applicable Sling Factor

By using a correct width spreader bar a 90° angle is achieved giving a sling factor of 1.

By increasing the sling angle a greater load is applied to the anchor which will cause additional stresses on the concrete element. Therefore the Sling Angle should never exceed 120°.



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

Slings factors follow as defined in AS3850:

SLING ANGLE	SLING ANGLE FACTOR
0°	1
15°	1.01
30°	1.04
45°	1.08
60°	1.16
75°	1.26
90°	1.42
105°	1.64
120°	2

To Check The Load On Each Anchor

$$\text{LOAD ON EACH ANCHOR} = \frac{\text{PANEL OR ELEMENT WEIGHT} \times \text{LOAD FACTOR} \times \text{SLINGING FACTOR (if applicable)}}{\text{NUMBER OF ANCHORS}}$$

To Check The Load On The Clutch And Sling Components

$$\text{LOAD ON CLUTCH} = \frac{\text{PANEL OR ELEMENT WEIGHT} \times \text{LOAD FACTOR} \times \text{SLINGING FACTOR (if applicable)}}{\text{NUMBER OF ANCHORS}}$$

### To Prevent Possible Failure From The Load Exceeding:

- Anchor Capacity      Increase the number of lifting points  
Or Select a higher WLL anchor group.
- Concrete Capacity    Select an Edgelift Anchor with a hanger bar  
Or Tie the anchor to extra reinforcing
- Clutch Capacity        Increase the number of lifting points  
Or Select a higher WLL clutch and anchor group.

## Concrete Breakout

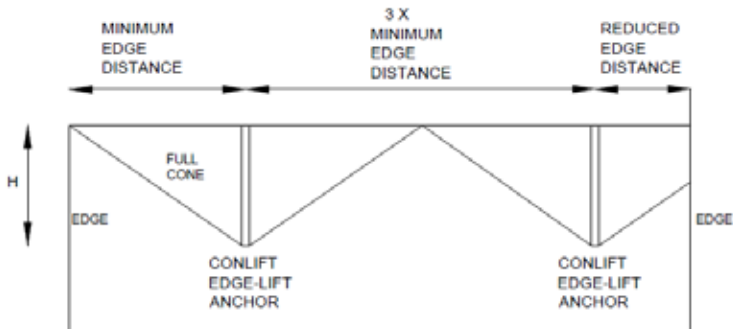
Failure of anchors in concrete relies on 6 factors:

- Compressive strength of the surrounding concrete.
- Strength of the anchor.
- The anchors' embedment depth  $h$ . This is defined by the anchor length and the set-down.
- The anchors' distance from any edge or face  $E$ . To fully develop the concrete breakout cone,  $E$  needs to be equal or greater than the designed minimum edge distance shown in Table 1 (Below).
- The distance between anchors  $c$ . To fully develop the concrete breakout cone,  $c$  needs to be equal or greater than 3 x the designed minimum edge distance. (See Table 1 Below).
- Direction of loading.
- Concrete breakout will occur at a proportionally reduced capacity when anchors are closer to edges or faces than the designed minimum edge distance shown in Table 1 (Below) or with a distance of less than 3 x the designed minimum edge distance (See Table 1 Below) between anchors.

**Table 1**

Plate Edge lift anchor	Panel Thickness (mm)	Minimum Edge distance (mm) $E$	Minimum distance between anchors (mm) $c$
EA25	100	191	273
	125	210	630
	150	216	648
	175	229	684
EA57	100	254	762
	125	254	762
	150	261	783
	175	280	840
EA10	100	362	1086
	125	362	1086
	150	362	1086
	175	362	1086
	200	362	1086

## Designed Minimum Edge Distance Between Anchors



## To Prediction of Concrete Cone Failure

The engineering principles of Haeussler or the ACI Concrete Capacity Design (CCD) models should be used to predict concrete cone failure.

## Calculation of Reduction Factors for Edge Distances

### Reduction Factor in Tension

Reduction Factor	$\Psi_2$
Designed Edge Distance	$E =$ (see Table 1, page 18)
Given Edge Distance	$a$
Thickness of the element	$D$
$\Psi_2 = [0.7 + 0.3 (a/E)] \times [(a + E) / 2E]$	

### Reduction Factor in Shear

Thickness of the Element will also affect the shear capacity of the anchor

Reduction Factor	$\Psi_\sigma$
Designed Edge Distance	$E =$ (see Table 1, page 18)
Given Edge Distance	$a$
Thickness of the element	$D$

$a < E$  and  $D > 1.5a$

Reduced edge distance and anchor length is greater than 1.5 edge distance

$$\Psi_\sigma = [0.7 + 0.3 (a/E)] \times [(a^2 / E^2)]$$

$a < E$  and  $D < 1.5a$

Reduced edge distance and anchor length is less than 1.5 edge distance

$$\Psi_\sigma = [0.7 + 0.3 (a/E)] \times [(a \times D / 1.5 \times E^2)]$$

$a > E$  but  $D < E$

Edge distance is as suggested and anchor length is less than the suggested edge distance

$$\Psi_\sigma = [(a \times D / 1.5 \times E^2)]$$

## Limiting Factor when Tension and Shear Loads are Applied at the Same Time

Be aware if both tension and shear loads occur at the same time check the combined load interaction.

$$T/T_a + V/V_a \leq 1.2$$

$T$	Applied load in Tension
$T_a$	Allowable load in Tension
$V$	Applied load in Shear
$V_a$	Allowable load in Shear







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**Conlift Concrete Lifting Systems**

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