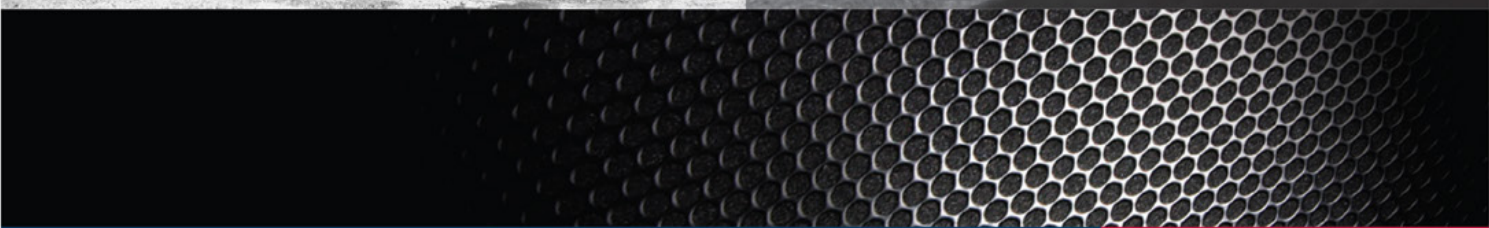
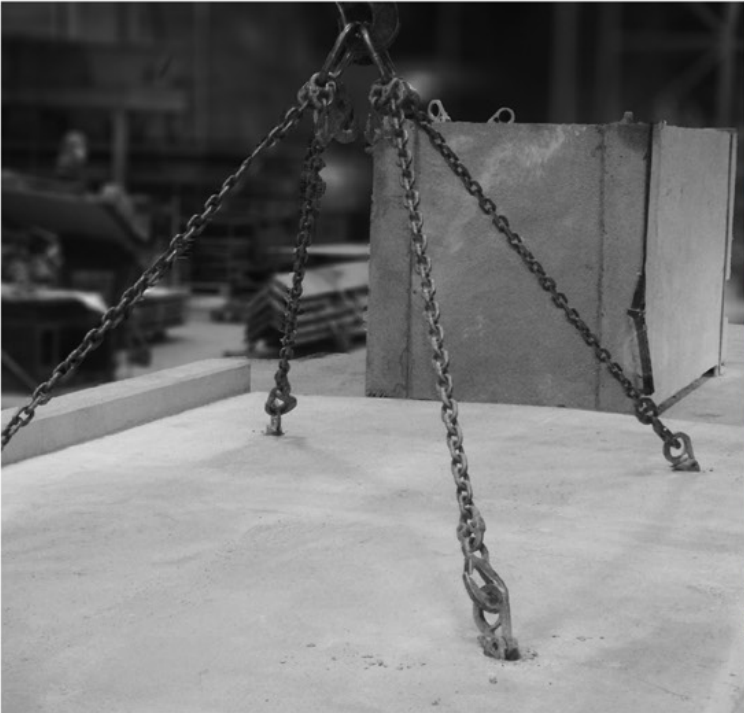


# Starcon Concrete Handling System



# Starcon

## Transport- and handling system

CERTEX Danmark A/S is one of the leading suppliers of accessories for the concrete industry when it comes to lifting, transport and fastening in concrete pipes, concrete elements etc.

In our Starcon department we offer advise and guidance for concrete factories, hauliers, crane companies, contractors and other companies who use or manufacture concrete products.

### Starcon systems include:

- Spherical anchor system
- 2-hole anchor
- Lifters
- Formers
- Threaded anchors
- Anchor channels
- Plastic parts
- Wire boxes

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## General description of the Starcon lifting and handling system

This user manual must be read and understood by the owner and user(s) before use.

The Starcon lifting and handling system is manufactured according to DS/CEN/TR 15728 and is in accordance with Directive 2006/42/EC.  
All Starcon lifting eyes are pull tested with a static testing co-efficient of 2.

The Starcon lifting and handling system consists of:  
1) Hot pressed Starcon lifting anchor and  
2) a casted steel Starcon lifting eye.

The Starcon lifting anchor and the Starcon lifting eye are designed to be coupled together - the opening of the lifting eye fits around the head of the lifting anchors head. The various load groups are non-interchangeable.

### Starcon lifting anchor, function and use:

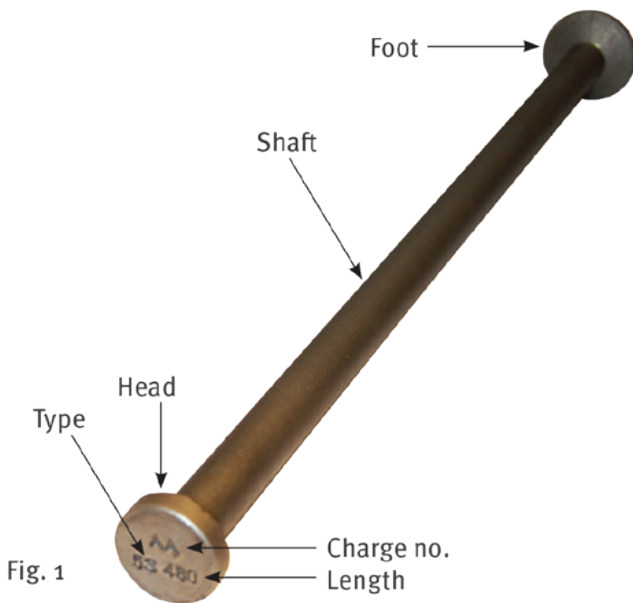
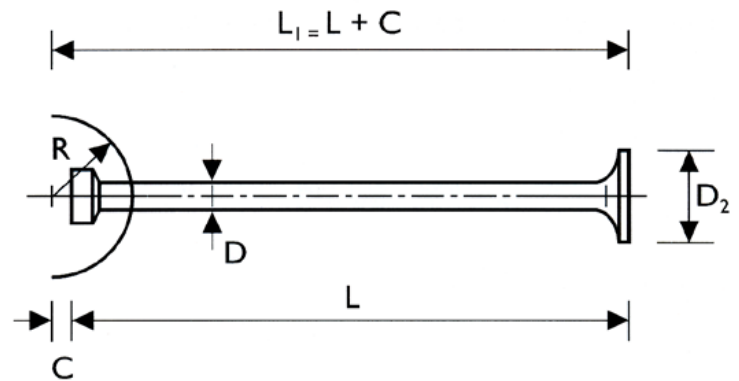


Fig. 1



Anchor rating ton	Shank dia. D mm	Foot dia. D <sub>2</sub> mm	Cover C mm	Former radius R mm
1,3	10	25	8	30
2,5	14	35	11	37
5,0	20	50	15	47
7,5	24	60	15	59
10,0	28	70	15	59
15,0	34	85	16	80
20,0	39	98	16	80

Table A

The head of the Starcon lifting anchor is fitted in a Starcon former of the same size/load group.  
The Starcon former with anchor must be fixed in the

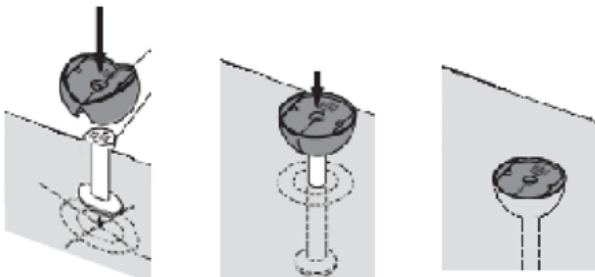


Fig. 2 Former with lifting anchor

concrete mould prior to concrete moulding.  
The correct recess for the Starcon lifting eye is achieved during moulding.

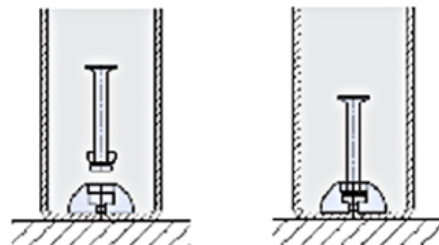


Fig. 3 Steel former with lifting anchor

During concrete moulding it must be ensured, that the concrete forms together and is compact around the full length of the Starcon lifting anchor and former. The Starcon former

can be removed when the concrete has reached a strength of min, 15MPa\*, see fig. 4, (\* with lower values contact CERTEX Danmark A/S).

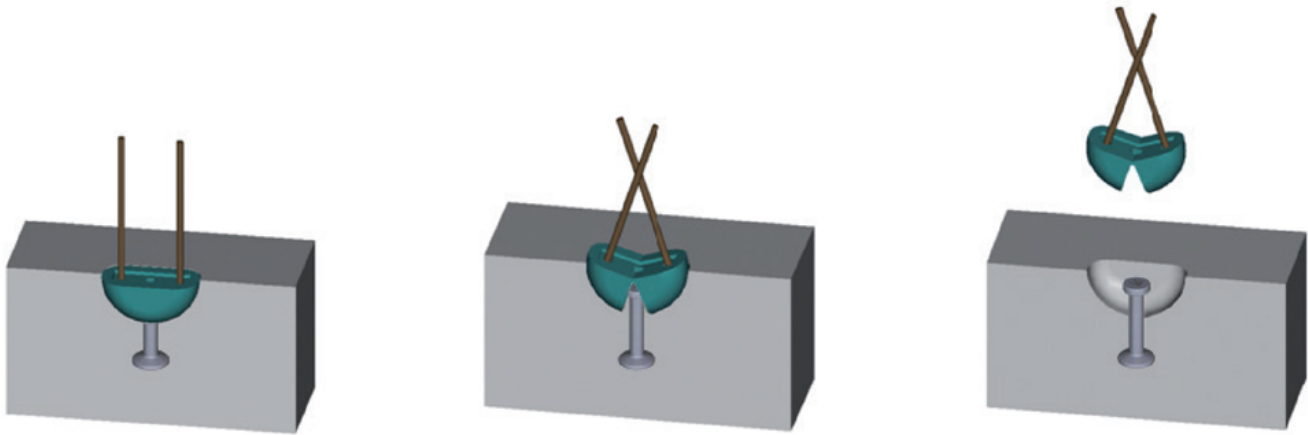


Fig. 4 Former with form removal pins

With pull-out of a Starcon lifting anchor a conical fracture will occur with a depth equal to the embedded depth and with a diameter of 6 times the embedded depth. The embedded depth,  $L_1$  = the distance from the concrete surface to the bottom of the foot of the Starcon lifting anchor. Optimal resistance for pull out of a Starcon lifting anchor in a concrete product can be obtained by choosing edge

distances,  $T > 3 \times L_1$  and mutual distances  $> 6 \times L_1$ , jf. fig. 5 and table B.

If the edge distances,  $T < 3 \times L_1$ , there is a reduction in the resistance against pull out of the Starcon lifting anchor is see fig. 6 and table C.

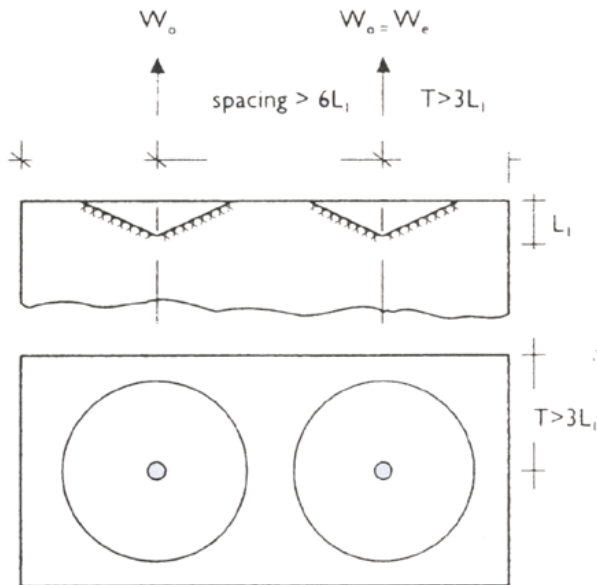


Fig. 5

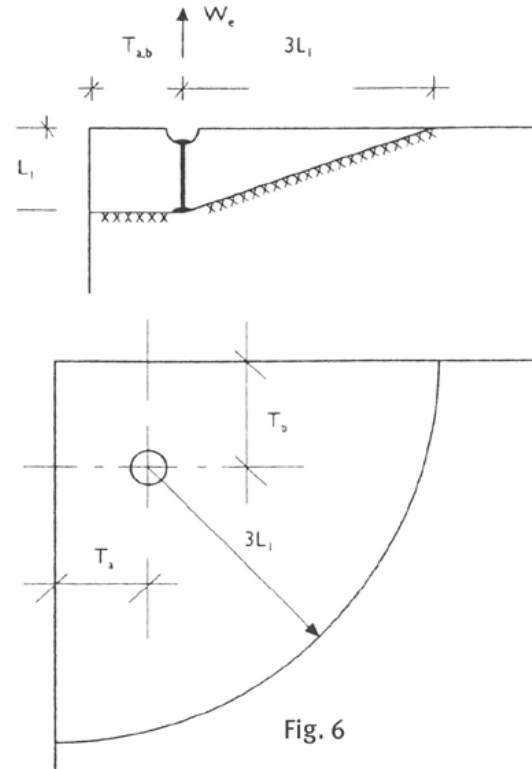


Fig. 6

Calculation criteria for the load tables B, C and D:

Pull-out theory: Cone with diameter = 3 x embedded depth of the Starcon lifting anchor.

Safety against breaking of the steel = 4,0.

Safety against pull-out from concrete = 4,0.

Partial coefficients: Deforming,  $q_{adh} = 1,0$ .

Dynamical impact factor in factory  $\psi_{dyn} = 1,0$ .

Dynamical impact factor on site  $\psi_{dyn} = 1,0$ .

Angle of lifting sling, in factory  $\leq 6^\circ$   
(lifting beam), on site  $\leq 45^\circ$

Concrete strength in factory,  $f_{ck} \geq 15\text{MPa}$ .

Concrete strength on site,  $f_{ck} \geq 25\text{MPa}$ .

Please contact CERTEX Danmark A/S in case of other criteria or queries.

Element weight ≤ ton	Edge distance T ≥ mm	Centre distance ≥ mm	Starcon lifting anchor Pcs./Type
1,4	255	510	2 pcs. 1,3S85
2,7	510	1.020	2 pcs. 2,5S170
5,4	720	1.440	2 pcs. 5,S240
8,1	900	1.800	2 pcs. 7,5S300
10,8	1.020	2.040	2 pcs. 10S340
16,3	1.200	2.400	2 pcs. 15S400
21,7	1.500	3.000	2 pcs. 20S500

Table B: Load table with optimal embedded distances for the Starcon lifting anchor in concrete without reinforcement.

Element weight ≤ ton	Edge distance T = 0,5 x length of lifting anchor mm	Centre distance = length of lifting anchor mm	Starcon lifting anchor Pcs./Type
0,275	42	85	2 pcs. 1,3S85
1,0	85	170	2 pcs. 2,5S170
2,1	120	240	2 pcs. 5S240
3,3	150	300	2 pcs. 7,5S300
4,3	170	340	2 pcs. 10S340
6,0	200	400	2 pcs. 15S400
9,3	250	500	2 pcs. 20S500

Table C: Load table with reduced embedded distances for the Starcon lifting anchor in concrete without reinforcement.

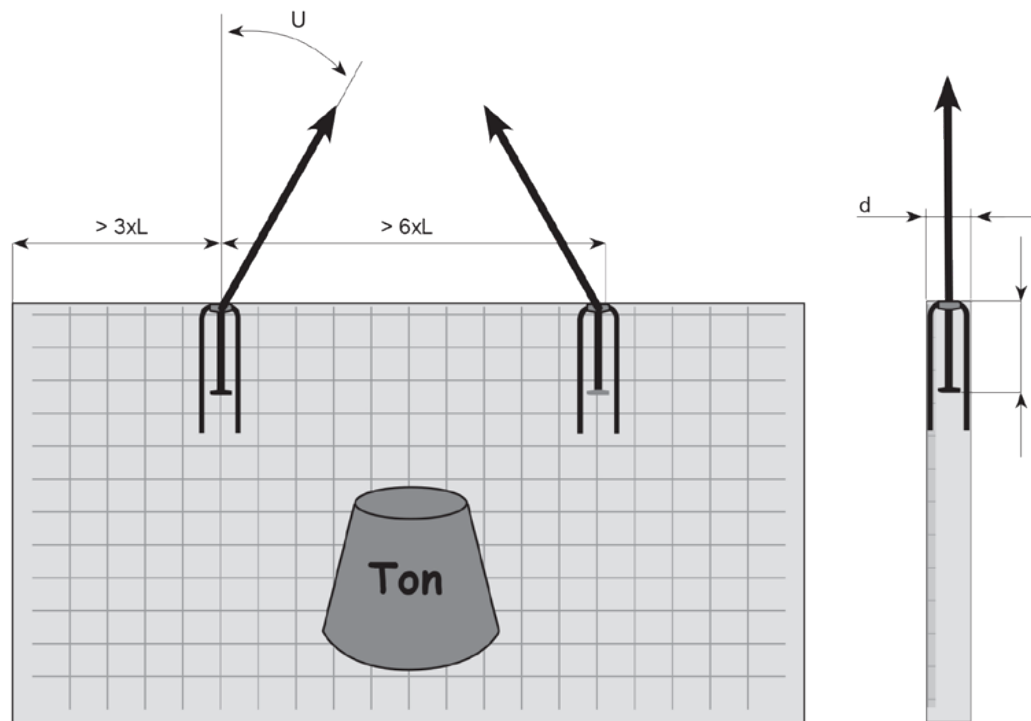


Fig. 7 Drawing of element

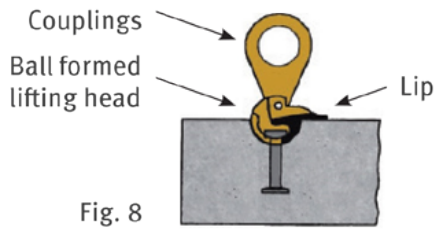
Element thickness d ≥ mm	Element weight ≤ ton	Starcon anchor type	Required min. reinforcing (Bow: Ø/leg length)
80	1,4	2 pcs. 1,3S85	1 pcs. net Ø6/150 mm
80	2,7	2 pcs. 2,5S170	1 pcs. net Ø6/150 mm and 1 pcs. bow Ø6/600 mm
120	5,4	2 pcs. 5S240	1 pcs. net Ø6/150 mm and 2 pcs. bow Ø6/600 mm
140	8,1	2 pcs. 7,5S300	1 pcs. net Ø6/150 mm and 2 pcs. bow Ø8/700 mm
160	10,8	2 pcs. 10S340	2 pcs. net Ø6/150 mm and 1 pcs. bow Ø8/800 mm
210	16,3	2 pcs. 15S400	2 pcs. net Ø6/150 mm and 2 pcs. bow Ø10/900 mm
220	21,7	2 pcs. 20S500	2 pcs. net Ø6/150 mm and 2 pcs. bow Ø12/1.100 mm

Table D: Load table with reduced embedded distances for the Starcon lifting anchor in concrete with reinforcement for transport.

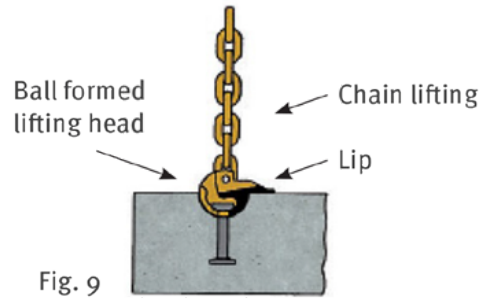
## Starcon Lifting Eye userguide

The Starcon lifting eye can be supplied with a coupling link (standard or flexible), see fig. 8, or can be fitted directly in a chainsling, see fig. 9

### Lifting eye with coupling link



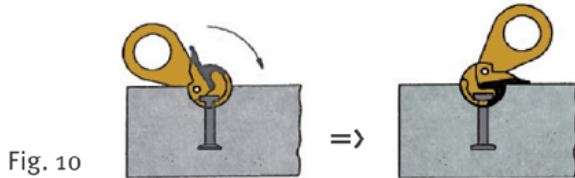
### Lifting eye with chainsling



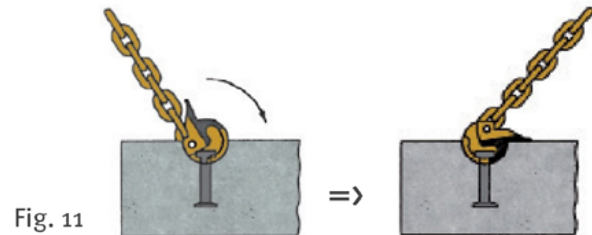
We recommend a minimum concrete strength of 15MPa\* before lifting in the factory may be commenced. This is typically with overhead crane(s) or a lifting beam. On the site we recommend a min. 25MPa\* before lifting commences, and this is typically with a lifting chain sling(s). (\* if the value is lower, please contact CERTEX Danmark A/S).

Coupling on is done by placing the opening in the Starcon Lifting Eye directly over the concrete recess where the head of the Starcon Lifting Anchor is placed and then turning the Starcon Lifting Eye over the head of the Starcon Lifting Anchor until the Starcon Lifting Eye rests on the concrete surface, acc. to fig. 10 and fig. 11.

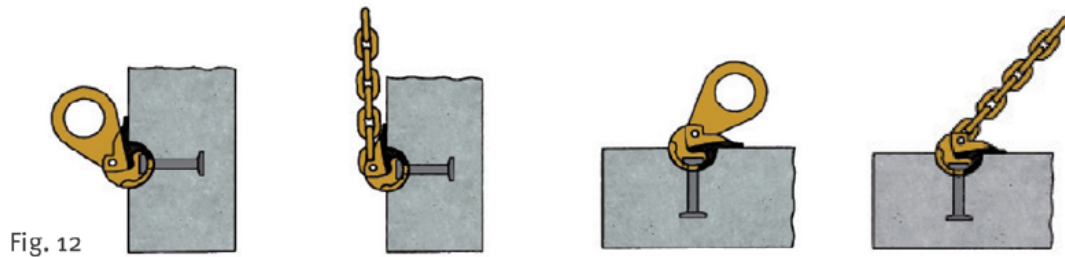
### Connecting lifting eye with coupling link



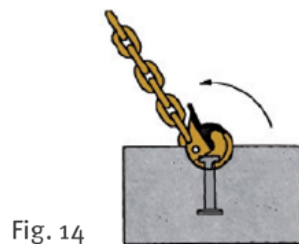
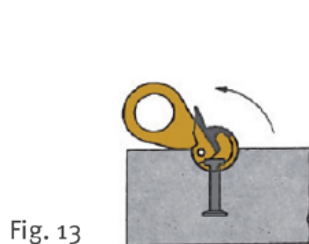
### Connecting lifting eye with chain sling



The lip of the Starcon lifting eye must always point in the direction of the pull acc. to fig. 12.



When removing, the lifting eye must be under no-load, so the lip of the Starcon lifting eye can be pivoted back until the lip is vertical, and the ball lifting head can be lifted off the anchor.



INSPECTION OF STARCON LIFTING EYES			
STARCON 1.0 - 1.3T	STARCON 1.5 - 2.5T	STARCON 3.0 - 5.0T	STARCON 6.0 - 10.0T
STARCON 12.0 - 20.0T	STARCON 12.0 - 20.0T		
How to make inspections of your Starcon Lifting Eyes			
Inspections explanation:			
Pos. 1  9±0.3 11±0.5 22±0.5 11±0.5 16±0.5 28±0.5	Pos. 1  14 22±0.5 38±0.5	Pos. 1  22 30±0.5 50±0.5	Pos. 1  28 41±0.5 72±0.5
Pos. 2 26±0.5	Pos. 2 30±0.5	Pos. 2 60±0.5	Pos. 2 54±0.5
Pos. 3 9.5±0.8	Pos. 3 15.5±0.8	Pos. 3 25±0.8	Pos. 3 32±0.8
Starcon Lifting Eye Inspection tool available for 1-1.3T/ 1.5-2.5T/3.0-5.0T			
Inspections explanation:			
Pos. 1 Measure diameter of bolt Pos. 2 Measure length of bolt	Pos. 1 Measure diameter of bolt Pos. 2 Measure length of bolt	Pos. 1 Measure length of coupling link Pos. 2 Measure thickness bottom of coupling link Pos. 3 Measure upper inside dia. of coupling link Pos. 4 Measure dia. of hole for bolt Pos. 5 Measure thickness of coupling link	Pos. 1 Measure inside width of master link Pos. 2 Measure inside length of master link Pos. 3 Measure dia. of master link Pos. 4 Measure inside chain link length Pos. 5 Measure dia. of chain link Pos. 6 Measure inside chain length of coupling link
Fig. 1 (Lifting Eye)	Fig. 1 (Lifting Eye)	Fig. 1 (Lifting Eye)	Fig. 1 (Lifting Eye)
Fig. 2 (Assembly pin)	Fig. 2 (Assembly pin)	Fig. 2 (Assembly pin)	Fig. 2 (Assembly pin)
Fig. 3 (Standard link)	Fig. 3 (Standard link)	Fig. 3 (Standard link)	Fig. 3 (Standard link)
Fig. 4 (Flexible link)	Fig. 4 (Flexible link)	Fig. 4 (Flexible link)	Fig. 4 (Flexible link)



## Starcon Universal Lifting Eye userguide

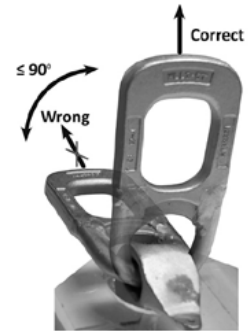
### A) Coupling

In order to connect the clutch to the anchor, the sphere is pushed with its opening facing downwards into the recess over the anchor.  
The lip of the sphere is then turned downwards to the concrete surface.



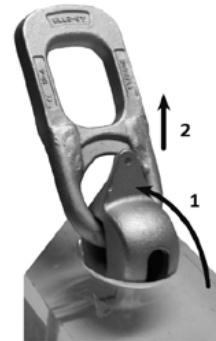
### B) Lift

The precast element can be lifted. Tilting, turning and swivelling of the concrete unit in motion is permissible in any direction, except for the positions marked 'wrong' in the drawing next to.

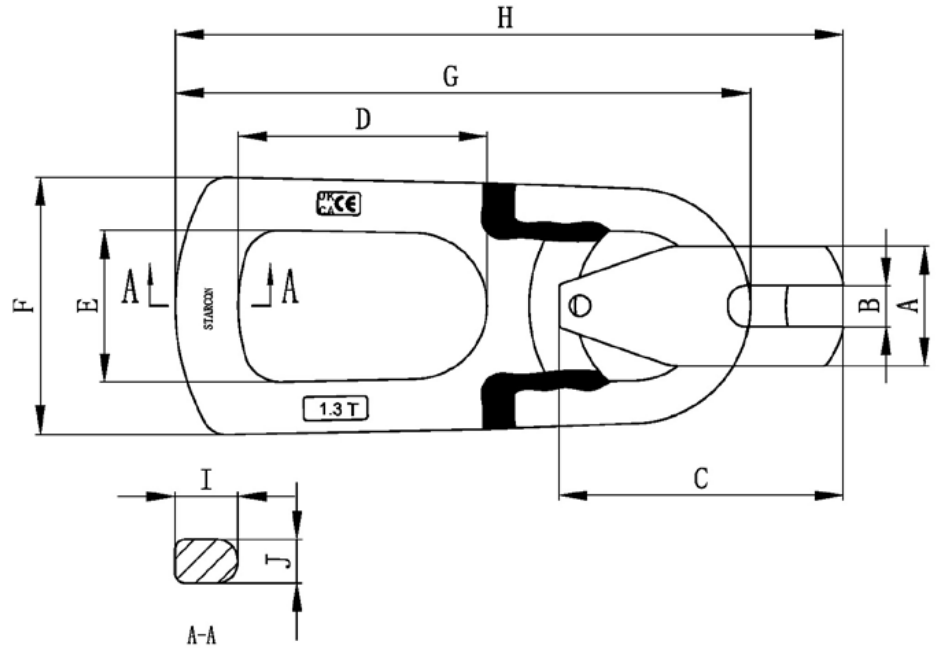


### C) Release

To release, the load hook is lowered and the sphere turned up and out.



## Inspection of Starcon Universal Lifting Eye



Load group	WLL t	A ±1	B +2/-0,5	C ±2	D ±2	E ±2	F ±2	G ±3	H ±3	I ±1	J +1,2/-0	Weight
1,3T	1,3	34	11,5	81	70,5	43,5	73	160	186	18	12,5	0,95
2,5T	2,5	42	16	99	85	50	88	190	225	27	14	1,5
5T	5	55	22	128	88	67,5	110	244	282	37	18	3,18
10T	10	74	30	174	116	82	159	342	391	51	27	9,12
20T	20	110	42	224	123,5	106	183	430	490	76,5	31	20,2

## Inspection of Starcon Universal Lifting Eye

After use the Starcon lifting eye should be cleaned and inspected for defects and faults. In case of defects, these must be repaired or the Starcon lifting eye must be discarded.

Every 12. months the Starcon lifting eye must go through a statutory inspection by an approved lifting equipment service technician.

The inspection is made by a visually inspection and measurement control of the parts in above measurement sheet. This inspection must be carried out by a competent person, who is knowledgeable about carrying out statutory inspection of lifting gear.

The measurements above must be measured, and if the result shows wear over the mentioned tolerances the STARCON Universal lifting eye must be discarded.

## Limitations in use Starcon lifting and handling system

The Starcon lifting and handling system must only be used for the designed purpose. If there is any queries on it's use contact the supervising officer before use.

The Starcon lifting anchor must only be fitted in a Starcon former of compatible type/load group.

A Starcon lifting anchor which is rusted, corroded or damaged must not be used.

The Starcon lifting anchor must only be attached by a lifting eye of compatible type/load group.

The Starcon lifting and handling system must not be used for lifting more than the permissible load.

The Starcon lifting and handling system must never be used for lifting of persons.

The Starcon lifting and handling system can be used in temperatures from -10°C up to +45°C.

## Warnings

Make sure that the lip of the Starcon lifting eye is always in contact with the concrete and points in the direction of pull.

Lifting equipment must be approved to lift at least the max. used load + the net weight of the Starcon lifting and handling system + any additional lifting equipment.

The lifting process must be calm, no sudden jerks or direction changes with the lifting equipment during movement, as this can lead to pendulum effect on the load which could result in a crush risk to personnel or the load being dropped.

If there is a potential risk between the load, building parts, machines etc. the operator/personnel may not remain within the movement area of the load.

The working area of the operator must be level and without obstacles on the ground which could be a stumbling risk.

No alterations or adjustments to the Starcon lifting system are permitted when the system is in a load condition.

The Starcon lifting eye must not be released or removed until the load has been placed on a secure foundation, which can bear the load, and the concrete product is secured so it cannot fall or be a risk to personnel in the working area.

Prior to each lift it must be confirmed, that both the Starcon lifting eye and the Starcon lifting anchor which is casted in the concrete product, is free of dirt, which could reduce the grip.

Do not place arms, feet or other body parts under a concrete product or in close proximity to lifting eye or coupling link.

The concrete product must never be dragged, only lifted.



**NEVER** make any changes on the Starcon lifting and handling system without written permission from the manufacturer.

The operator must always ensure that the connection between the lifting equipment, and/or any possible lifting tools and the Starcon lifting eye is correct and secured against accidental de-coupling.

The operator must always ensure that the connection between the Starcon lifting eye and the Starcon lifting anchor in the concrete product is correct and secured against accidental de-coupling.

The operator must always confirm that the connection between the Starcon lifting eye and the Starcon lifting anchor in the concrete product is correct and secured against accidental de-coupling.

Staying and travel under hanging load is not allowed.

Always use gloves and safety shoes during handling.

Do not use a Starcon lifting and handling system with visible defects and faults such as wear and tear, deformations, rust damages etc.

## Maintenance and inspection

Please also see "Inspection of Starcon Lifting Eyes" with flexible link/standard link and Inspection of Starcon Universal Lifting Eye.

All maintenance must take place when the Starcon lifting eye is de-coupled and in a no-load condition.

The Starcon lifting eye must be inspected and maintained, in order to keep it in good condition during use.

After use the Starcon lifting eye should be cleaned and inspected for defects and faults. In case of defects, these must be repaired or the Starcon lifting eye must be discarded.

The Starcon lifting eye should always be stored in a dry and airy place.

A damaged, rust damaged or corroded Starcon lifting eye must not be used.

Every 12. months the Starcon lifting eye must go through a statutory inspection by an approved lifting equipment service technician.

## Starcon anchor tensile and shear capacity

### When anchors are used in the face of thin concrete elements

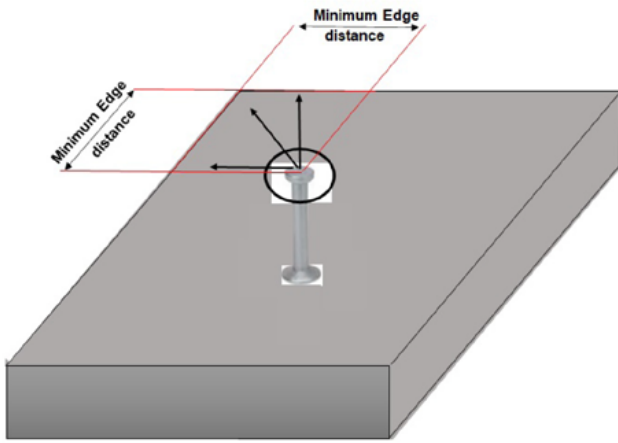
The following table lists the Starcon anchors that are currently manufactured. Other sizes and lengths are available on special order. However, the sizes and lengths of anchors shown will handle the majority of flat precast concrete elements.

When the Starcon anchor is properly embedded in normal weight concrete, the tabulated working loads are applicable for any direction of load. This applies even if the direction of load is parallel to the axis of the anchor, perpendicular to it or at any other angle.

Minimum distance between anchors is twice the minimum edge distance. It is critical to remember that in order to obtain the safe working loads listed in the table below, the normal weight concrete must have obtained the minimum concrete strength shown, prior to initial load application.

This table is based on 1 piece Starcon spherical anchor built in under optimal conditions as illustrated without the use of extra reinforcement.

Capacity x Length	SWL at concrete strength		SWL at concrete strength		
	Standard	Metric	1600 psi	11 Mpa	2175 psi
1 ton - 1 1/2 in	975 kg - 40 mm	531 lbs	241 kg	655 lbs	297 kg
1 ton - 2 1/4 in	975 kg - 55 mm	944 lbs	458 kg	1.162 lbs	527 kg
1 ton - 2 5/8 in	975 kg - 65 mm	1.281 lbs	581 kg	1.671 lbs	758 kg
1 ton - 3 3/8 in	975 kg - 85 mm	1.953 lbs	886 kg	1.953 lbs	886 kg
1 ton - 4 3/4 in	975 kg - 120 mm	1.953 lbs	886 kg	1.953 lbs	886 kg
1 ton - 9 1/2 in	975 kg - 240 mm	1.953 lbs	886 kg	1.953 lbs	886 kg
2 ton - 1 3/4 in	1.875 kg - 45 mm	705 lbs	320 kg	820 lbs	372 kg
2 ton - 2 1/4 in	1.875 kg - 55 mm	955 lbs	433 kg	1.175 lbs	533 kg
2 ton - 2 3/4 in	1.875 kg - 68 mm	1.402 lbs	636 kg	1.839 lbs	834 kg
2 ton - 2 3/8 in	1.875 kg - 85 mm	2.224 lbs	1.009 kg	2.743 lbs	1.244 kg
2 ton - 4 in	1.875 kg - 100 mm	3.175 lbs	1.440 kg	3.759 lbs	1.705 kg
2 ton - 4 3/4 in	1.875 kg - 120 mm	3.759 lbs	1.705 kg	3.759 lbs	1.705 kg
2 ton - 5 1/2 in	1.875 kg - 140 mm	3.759 lbs	1.705 kg	3.759 lbs	1.705 kg
2 ton - 6 3/4 in	1.875 kg - 170 mm	3.759 lbs	1.705 kg	3.759 lbs	1.705 kg
2 ton - 11 in	1.875 kg - 280 mm	3.759 lbs	1.705 kg	3.759 lbs	1.705 kg
4 ton - 2 5/8 in	3.750 kg - 65 mm	1.292 lbs	586 kg	1.693 lbs	768 kg
4 ton - 3 in	3.750 kg - 75 mm	1.777 lbs	806 kg	2.187 lbs	992 kg
4 ton - 3 3/8 in	3.750 kg - 85 mm	2.229 lbs	1.011 kg	2.743 lbs	1.244 kg
4 ton - 3 1/2 in	3.750 kg - 88 mm	2.374 lbs	1.070 kg	3.111 lbs	1.411 kg
4 ton - 3 3/4 in	3.750 kg - 95 mm	2.897 lbs	1.314 kg	3.565 lbs	1.617 kg
4 ton - 4 1/2 in	3.750 kg - 110 mm	3.770 lbs	1.710 kg	4.641 lbs	2.105 kg
4 ton - 4 3/4 in	3.750 kg - 120 mm	4.416 lbs	2.003 kg	5.434 lbs	2.465 kg
4 ton - 5 1/4 in	3.750 kg - 134 mm	5.401 lbs	2.450 kg	6.647 lbs	3.015 kg
4 ton - 5 1/2 in	3.750 kg - 140 mm	5.853 lbs	2.655 kg	7.205 lbs	3.268 kg
4 ton - 6 in	3.750 kg - 150 mm	6.647 lbs	3.015 kg	7.518 lbs	3.410 kg
4 ton - 6 1/4 in	3.750 kg - 160 mm	7.489 lbs	3.397 kg	7.518 lbs	3.410 kg
4 ton - 7 1/8 in	3.750 kg - 180 mm	7.518 lbs	3.410 kg	7.518 lbs	3.410 kg
4 ton - 7 3/4 in	3.750 kg - 210 mm	7.518 lbs	3.410 kg	7.518 lbs	3.410 kg
4 ton - 9 1/2 in	3.750 kg - 240 mm	7.518 lbs	3.410 kg	7.518 lbs	3.410 kg
4 ton - 13 3/8 in	3.750 kg - 340 mm	7.518 lbs	3.410 kg	7.518 lbs	3.410 kg
4 ton - 19 in	3.750 kg - 480 mm	7.518 lbs	3.410 kg	7.518 lbs	3.410kg
6 ton - 2 3/8 in	5.625 kg - 85 mm	2.229 lbs	1.011 kg	2.743 lbs	1.215 kg
6 ton - 5 1/2 in	5.625 kg - 140 mm	5.853 lbs	2.655 kg	7.205 lbs	3.268 kg
6 ton - 6 in	5.625 kg - 150 mm	6.647 lbs	3.015 kg	8.179 lbs	3.710 kg
6 ton - 6 1/2 in	5.625 kg - 165 mm	6.858 lbs	3.111 kg	6.858 lbs	3.111 kg
6 ton - 7 14/16 in	5.625 kg - 200 mm	7.518 lbs	3.410 kg	7.518 lbs	3.410 kg
6 ton - 11 26/32 in	5.625 kg - 300 mm	7.694 lbs	3.490 kg	7.694 lbs	3.490 kg
6 ton - 21 17/64 in	5.625 kg - 540 mm	12.346 lbs	5.600 kg	12.346 lbs	5.600 kg



SWL at concrete strength		SWL at concrete strength		Minimum edge distance	
2755 psi	19 Mpa	3500 psi	24 Mpa	Standard	Metric
767 lbs	348 kg	897 lbs	407 kg	5 in	120 mm
1.362 lbs	618 kg	1.698 lbs	770 kg	6 in	165 mm
1.953 lbs	886 kg	1.953 lbs	886 kg	8 in	195 mm
1.953 lbs	886 kg	1.953 lbs	886 kg	10 in	255 mm
1.953 lbs	886 kg	1.953 lbs	886 kg	14 in	360 mm
1.953 lbs	886 kg	1.953 lbs	886 kg	28 in	720 mm
961 lbs	436 kg	1.124 lbs	510 kg	5 in	135 mm
1.376 lbs	624 kg	1.728 lbs	784 kg	6 in	165 mm
2.152 lbs	976 kg	2.515 lbs	1.141 kg	8 in	204 mm
3.428 lbs	1.555 kg	4.007 lbs	1.818 kg	10 in	255 mm
3.759 lbs	1.705 kg	3.759 lbs	1.705 kg	12 in	300 mm
3.759 lbs	1.705 kg	3.759 lbs	1.705 kg	14 in	360 mm
3.759 lbs	1.705 kg	3.759 lbs	1.705 kg	17 in	420 mm
3.759 lbs	1.705 kg	3.759 lbs	1.705 kg	20 in	510 mm
3.759 lbs	1.705 kg	3.759 lbs	1.705 kg	33 in	840 mm
1.984 lbs	900 kg	2.321 lbs	1.053 kg	8 in	195 mm
2.564 lbs	1.163 kg	3.414 lbs	1.458 kg	9 in	225 mm
3.426 lbs	1.554 kg	4.008 lbs	1.818 kg	10 in	255 mm
3.644 lbs	1.653 kg	4.261 lbs	1.933 kg	10 in	264 mm
4.178 lbs	1.895 kg	4.885 lbs	2.216 kg	11 in	285 mm
5.437 lbs	2.466 kg	6.358 lbs	2.884 kg	13 in	330 mm
6.367 lbs	2.888 kg	7.445 lbs	3.377 kg	14 in	360 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	16 in	402 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	17 in	420 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	18 in	450 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	19 in	480 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	21 in	540 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	25 in	630 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	28 in	720 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	40 in	1.020 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	57 in	1.440 mm
3.425 lbs	1.554 kg	4.008 lbs	1.818 kg	10 in	255 mm
8.439 lbs	3.828 kg	9.868 lbs	4.476 kg	17 in	420 mm
9.583 lbs	4.347 kg	11.206 lbs	5.083 kg	18 in	450 mm
6.858 lbs	3.111 kg	6.858 lbs	3.111 kg	19 in	495 mm
7.518 lbs	3.410 kg	7.518 lbs	3.410 kg	23 in	600 mm
7.694 lbs	3.490 kg	7.694 lbs	3.490 kg	35 in	900 mm
12.346 lbs	5.600 kg	12.346 lbs	5.600 kg	63 in	1.620 mm

This table is based on 1 piece Starcon spherical anchor built in under optimal conditions as illustrated without the use of extra reinforcement (continued from previous page).

Standard	Capacity x Length		SWL at concrete strength		SWL at concrete strength	
	Metric		1600 psi	11 Mpa	2175 psi	15 Mpa
8 ton - 4-3/4 in	7.500 kg - 120 mm		4.416 lbs	2.003 kg	5.434 lbs	2.465 kg
8 ton - 5-1/4 in	7.500 kg - 135 mm		5.474 lbs	2.483 kg	6.737 lbs	3.056 kg
8 ton - 5-3/4 in	7.500 kg - 150 mm		6.647 lbs	3.015 kg	8.179 lbs	3.710 kg
8 ton - 6-1/4 in	7.500 kg - 160 mm		7.489 lbs	3.397 kg	9.218 lbs	4.181 kg
8 ton - 6-3/4 in	7.500 kg - 170 mm		8.373 lbs	3.798 kg	10.306 lbs	4.675 kg
8 ton - 7-1/8 in	7.500 kg - 180 mm		9.223 lbs	4.229 kg	11.576 lbs	5.251 kg
8 ton - 7-3/4 in	7.500 kg - 210 mm		12.544 lbs	5.690 kg	15.031 lbs	6.818 kg
8 ton - 8-1/4 in	7.500 kg - 220 mm		13.690 lbs	6.210 kg	15.031 lbs	6.818 kg
8 ton - 10 in	7.500 kg - 250 mm		15.031 lbs	6.818 kg	15.031 lbs	6.818 kg
8 ton - 13-3/8 in	7.500 kg - 340 mm		15.031 lbs	6.818 kg	15.031 lbs	6.818 kg
8 ton - 26-3/4 in	7.500 kg - 680 mm		15.031 lbs	6.818 kg	15.031 lbs	6.818 kg
12 ton - 6 1/2 in	11.250 kg - 165 mm		13.669 lbs	6.200 kg	13.669 lbs	6.200 kg
12 ton - 7 14/16 in	11.250 kg - 200 mm		15.124 lbs	6.860 kg	15.124 lbs	6.860 kg
12 ton - 11 26/32 in	11.250 kg - 300 mm		15.873 lbs	7.200 kg	15.873 lbs	7.200 kg
12 ton - 21 17/64 in	11.250 kg - 540 mm		24.912 lbs	11.300 kg	24.912 lbs	11.300 kg
20 ton - 8 in	20.000 kg - 200 mm		11.448 lbs	5.193 kg	14.092 lbs	6.392 kg
20 ton - 10 in	20.000 kg - 250 mm		17.425 lbs	7.904 kg	21.446 lbs	9.728 kg
20 ton - 19 3/4 in	20.000 kg - 500 mm		30.062 lbs	13.636 kg	30.062 lbs	13.636 kg

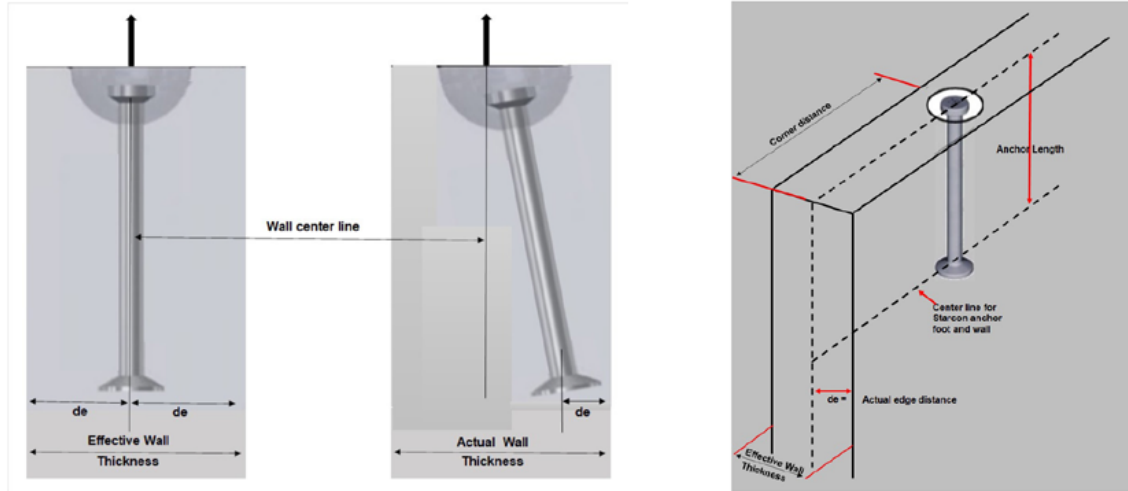
SWL's provide a factor of safety of 4 to 1 in normal weight concrete.

SWL at concrete strength		SWL at concrete strength		Minimum edge distance	
2755 psi	19 Mpa	3500 psi	24 Mpa	Standard	Metric
6.367 lbs	2.888 kg	7.445 lbs	3.377 kg	14 in	360 mm
7.895 lbs	3.581 kg	9.231 lbs	4.187 kg	16 in	405 mm
9.583 lbs	4.347 kg	11.206 lbs	5.083 kg	18 in	450 mm
10.798 lbs	4.898 kg	12.749 lbs	5.783 kg	19 in	480 mm
12.185 lbs	5.527 kg	14.248 lbs	6.463 kg	20 in	510 mm
13.563 lbs	6.152 kg	15.031 lbs	6.818 kg	21 in	540 mm
15.031 lbs	6.818 kg	15.031 lbs	6.818 kg	25 in	630 mm
15.031 lbs	6.818 kg	15.031 lbs	6.818 kg	26 in	660 mm
15.031 lbs	6.818 kg	15.031 lbs	6.818 kg	30 in	750 mm
15.031 lbs	6.818 kg	15.031 lbs	6.818 kg	40 in	1.020 mm
15.031 lbs	6.818 kg	15.031 lbs	6.818 kg	80 in	2.040 mm
13.669 lbs	6.200 kg	13.669 lbs	6.200 kg	19 in	495 mm
15.124 lbs	6.860 kg	15.124 lbs	6.860 kg	23 in	600 mm
15.873 lbs	7.200 kg	15.873 lbs	7.200 kg	35 in	900 mm
24.912 lbs	11.300 kg	24.912 lbs	11.300 kg	63 in	1.620 mm
16.508 lbs	7.488 kg	19.303 lbs	8.756 kg	24 in	600 mm
25.123 lbs	11.396 kg	29.378 lbs	13.326 kg	30 in	750 mm
30.062 lbs	13.636 kg	30.062 lbs	13.326 kg	59 in	1.500 mm

## Starcon anchor in thin walls

Starcon anchors, listed below, must be located the minimum distance away from a corner with the anchor foot being positioned at the center line of the wall. The anchor head location may be off center, however, any eccentricity of the foot will result in a reduction of the safe working load. When the anchor foot is not positioned at the center line of the wall, the effective wall thickness is equal to twice the actual edge distance.

To develop the safe working load of Starcon anchor, the minimum spacing between two anchors is six times the anchor length.



Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		6" / lbs
Standard	Metric	in	cm	in	cm	
1 ton - 4 3/4 in	975 kg - 120 mm	2-1/2	6	1-1/4	3	650
1 ton - 4 3/4 in	975 kg - 120 mm	2-3/4	7	1-3/8	3	769
1 ton - 4 3/4 in	975 kg - 120 mm	3	8	1-1/2	4	1.071
1 ton - 4 3/4 in	975 kg - 120 mm	3-1/2	9	1-3/4	4	1.137
1 ton - 4 3/4 in	975 kg - 120 mm	4	10	2	5	1.564
1 ton - 4 3/4 in	975 kg - 120 mm	4-1/2	11	2-1/4	6	1.644
1 ton - 9 1/2 in	975 kg - 240 mm	2-1/2	6	1-1/4	3	1.333
1 ton - 9 1/2 in	975 kg - 240 mm	2-3/4	7	1-3/8	3	1.417
1 ton - 9 1/2 in	975 kg - 240 mm	3	8	1-1/2	4	1.536
1 ton - 9 1/2 in	975 kg - 240 mm	3-1/2	9	1-3/4	4	1.875
1 ton - 9 1/2 in	975 kg - 240 mm	4	10	2	5	2.012
1 ton - 9 1/2 in	975 kg - 240 mm	4-1/2	11	2-1/4	6	2.071

Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		8" / lbs
Standard	Metric	in	cm	in	cm	
2 ton - 6 3/4 in	1.875 kg - 170 mm	1-1/2	4	1.415	642	1.415
2 ton - 6 3/4 in	1.875 kg - 170 mm	1-5/8	4	1.415	642	1.415
2 ton - 6 3/4 in	1.875 kg - 170 mm	1-3/4	4	1.749	794	1.749
2 ton - 6 3/4 in	1.875 kg - 170 mm	2	5	1.957	888	1.957
2 ton - 6 3/4 in	1.875 kg - 170 mm	2-1/2	6	2.593	1.177	2.593
2 ton - 6 3/4 in	1.875 kg - 170 mm	3	8	3.030	1.375	3.030
2 ton - 11 in	1.875 kg - 280 mm	3	8	1-1/2	4	1.879
2 ton - 11 in	1.875 kg - 280 mm	3-1/4	8	1-5/8	4	1.879
2 ton - 11 in	1.875 kg - 280 mm	3-1/2	9	1-3/4	4	2.124
2 ton - 11 in	1.875 kg - 280 mm	4	10	2	5	2.369
2 ton - 11 in	1.875 kg - 280 mm	5	13	2-1/2	6	3.122
2 ton - 11 in	1.875 kg - 280 mm	6	15	3	8	3.631

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete. Reinforcement 2 pcs. of U-bars Ø6 mm x 610 mm in the area of the spherical anchor.



To recalculate the safe working load when the anchor is used in a lower strength concrete, multiply the tabulated safe working load by the following reduction factors:

Concrete strength	Reduction factor
2.000 psi	.66
2.500 psi	.74
3.000 psi	.81
3.500 psi	.88
4.000 psi	.94
4.500 psi	1.00

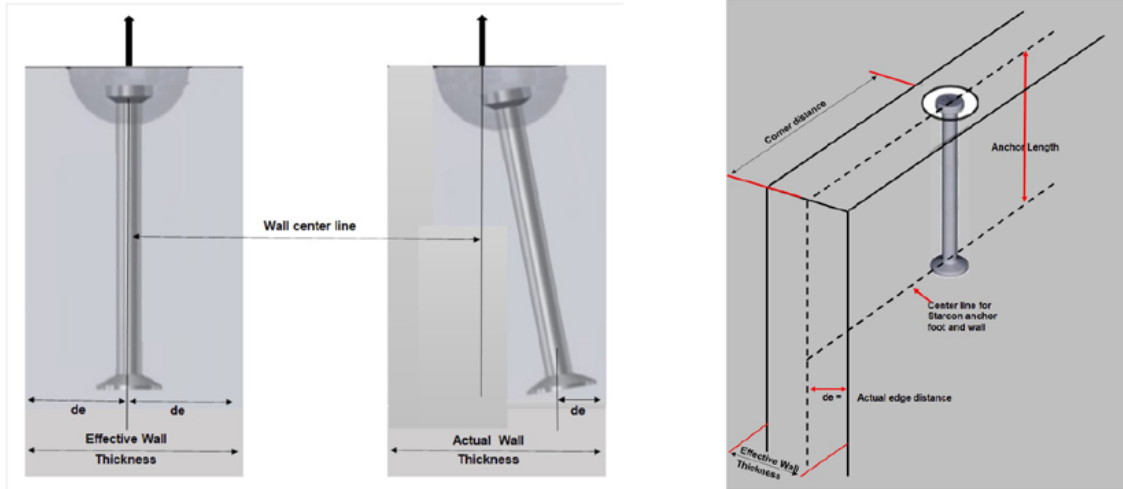
Tensile Safe Working Load per Anchor - Actual corner distance								
15 cm / kg	12" / lbs	30 cm / kg	18" / lbs	46 cm / kg	24" / lbs	61 cm / kg	30" / lbs	76 cm / kg
295	958	435	1.287	584	1.459	662	1.593	723
349	1.133	514	0	-	0	0	0	-
486	1.071	486	1.071	486	1.071	486	1.071	486
516	1.137	516	1.137	516	1.137	516	1.137	516
710	1.564	710	1.564	710	1.564	710	1.564	710
746	1.644	746	1.644	746	1.644	746	1.644	746
605	1.333	605	1.333	605	1.333	605	1.333	605
643	1.417	643	1.417	643	1.417	643	1.417	643
697	1.536	697	1.536	697	1.536	697	1.536	697
851	1.875	851	1.875	851	1.875	851	1.875	851
913	2.012	913	2.012	913	2.012	913	2.012	913
940	2.071	940	2.071	940	2.071	940	2.071	940

Tensile Safe Working Load per Anchor - Actual corner distance								
20 cm / kg	12" / lbs	30 cm / kg	18" / lbs	46 cm / kg	24" / lbs	61 cm / kg	30" / lbs	76 cm / kg
642	1.415	642	1.415	642	1.415	642	1.415	642
642	1.415	642	1.415	642	1.415	642	1.415	642
794	1.749	794	1.749	794	1.749	794	1.749	794
888	1.957	888	1.957	888	1.957	888	1.957	888
1.177	2.593	1.177	2.593	1.177	2.593	1.177	2.593	1.177
1.375	3.030	1.375	3.030	1.375	3.030	1.375	3.030	1.375
853	1.879	853	1.879	853	1.879	853	1.879	853
853	1.879	853	1.879	853	1.879	853	1.879	853
964	2.124	964	2.124	964	2.124	964	2.124	964
1.075	2.369	1.075	2.369	1.075	2.369	1.075	2.369	1.075
1.417	3.122	1.417	3.122	1.417	3.122	1.417	3.122	1.417
1.648	3.631	1.648	3.631	1.648	3.631	1.648	3.631	1.648

## Starcon anchor in thin walls

Starcon anchors, listed below, must be located the minimum distance away from a corner with the anchor foot being positioned at the center line of the wall. The anchor head location may be off center, however, any eccentricity of the foot will result in a reduction of the safe working load. When the anchor foot is not positioned at the center line of the wall, the effective wall thickness is equal to twice the actual edge distance.

To develop the safe working load of Starcon anchor, the minimum spacing between two anchors is six times the anchor length.



Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		10" / lbs
Standard	Metric	in	cm	in	cm	
4 ton - 9 1/2 in	3.750 kg - 240 mm	3-3/4	10	1-7/8	5	2.500
4 ton - 9 1/2 in	3.750 kg - 240 mm	4	10	2	5	2.600
4 ton - 9 1/2 in	3.750 kg - 240 mm	5	13	2-1/2	6	3.300
4 ton - 9 1/2 in	3.750 kg - 240 mm	6	15	3	8	4.000
4 ton - 9 1/2 in	3.750 kg - 240 mm	7	18	3-1/2	9	4.700
4 ton - 9 1/2 in	3.750 kg - 240 mm	8	20	4	10	5.300
4 ton - 19 in	3.750 kg - 480 mm	3-3/4	10	1-7/8	5	3.500
4 ton - 19 in	3.750 kg - 480 mm	4	10	2	5	3.800
4 ton - 19 in	3.750 kg - 480 mm	5	13	2-1/2	6	4.700
4 ton - 19 in	3.750 kg - 480 mm	6	15	3	8	5.700
4 ton - 19 in	3.750 kg - 480 mm	7	18	3-1/2	9	6.600
4 ton - 19 in	3.750 kg - 480 mm	8	20	4	10	7.600

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete  
Reinforcement 2 pcs. of U-bars Ø6 mm x 720 mm in the area of the spherical anchor

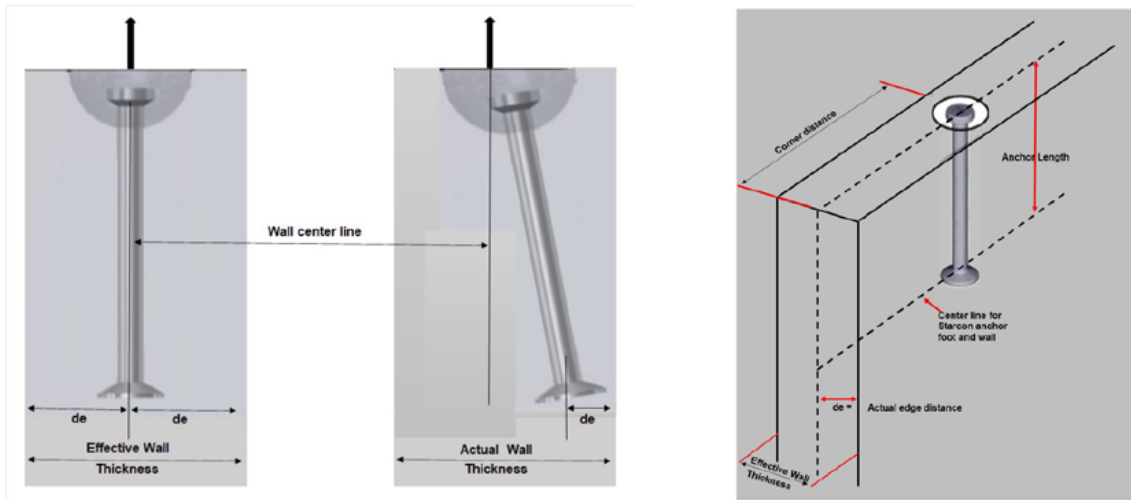
To recalculate the safe working load when the anchor is used in a lower strength concrete, multiply the tabulated safe working load by the following reduction factors:

Concrete strength	Reduction factor
2.000 psi	.66
2.500 psi	.74
3.000 psi	.81
3.500 psi	.88
4.000 psi	.94
4.500 psi	1.00

Tensile Safe Working Load per Anchor - Actual corner distance								
25 cm / kg	16" / lbs	41 cm / kg	24" / lbs	61 cm / kg	30" / lbs	76 cm / kg	42" / lbs	107 cm / kg
1.036	3.000	1.036	3.300	1.036	3.400	1.036	3.500	1.036
1.036	3.200	1.036	3.500	1.036	3.700	1.036	3.800	1.036
1.366	4.000	1.602	4.400	1.602	4.600	1.602	4.700	1.602
1.590	4.800	1.849	5.300	1.849	5.500	1.849	5.700	1.849
1.935	5.600	2.219	6.200	3.762	6.500	3.762	6.600	3.762
2.169	6.400	3.115	7.000	3.762	7.400	3.762	7.600	3.762
1.233	4.300	2.258	4.900	2.336	5.300	2.336	5.800	2.336
1.233	4.600	2.258	5.300	2.336	5.700	2.336	6.200	2.336
2.396	5.700	3.061	6.500	3.061	7.100	3.061	7.800	3.061
2.495	6.900	2.495	7.900	2.495	8.000	2.495	8.000	2.495
3.762	8.000	3.762	8.000	3.762	8.000	3.762	8.000	3.762
3.762	8.000	3.762	8.000	3.762	8.000	3.762	8.000	3.762

## Starcon anchor in thin walls

Starcon anchors, listed below, must be located the minimum distance away from a corner with the anchor foot being positioned at the center line of the wall. The anchor head location may be off center, however, any eccentricity of the foot will result in a reduction of the safe working load. When the anchor foot is not positioned at the center line of the wall, the effective wall thickness is equal to twice the actual edge distance. To develop the safe working load of Starcon anchor, the minimum spacing between two anchors is six times the anchor length.



Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		12" / lbs
Standard	Metric	in	cm	in	cm	
8 ton - 13-3/8 in	7.500 kg - 340 mm	4-3/4	12	2-3/8	6	3.913
8 ton - 13-3/8 in	7.500 kg - 340 mm	5	13	2-1/2	6	4.239
8 ton - 13-3/8 in	7.500 kg - 340 mm	6	15	3	8	4.889
8 ton - 13-3/8 in	7.500 kg - 340 mm	7	18	3-1/2	9	5.870
8 ton - 13-3/8 in	7.500 kg - 340 mm	8	20	4	9	6.520
8 ton - 13-3/8 in	7.500 kg - 340 mm	10	25	5	13	8.150
8 ton - 13-3/8 in	7.500 kg - 340 mm	12	30	6	15	9.779
8 ton - 26-3/4 in	7.500 kg - 680 mm	4-3/4	12	2-3/8	6	3.911
8 ton - 26-3/4 in	7.500 kg - 680 mm	5	13	2-1/2	6	4.325
8 ton - 26-3/4 in	7.500 kg - 680 mm	6	15	3	8	4.889
8 ton - 26-3/4 in	7.500 kg - 680 mm	7	18	3-1/2	9	9.605
8 ton - 26-3/4 in	7.500 kg - 680 mm	8	20	4	9	11.940
8 ton - 26-3/4 in	7.500 kg - 680 mm	10	25	5	13	11.940
8 ton - 26-3/4 in	7.500 kg - 680 mm	12	30	6	15	11.940

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete  
Reinforcement 2 pcs. of U-bars Ø6 mm x 720 mm in the area of the spherical anchor

Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		10" / lbs
Standard	Metric	in	cm	in	cm	
20 ton - 19 3/4 in	20.000 kg - 500 mm	6-1/2	17	3-1/4	8	6.773
20 ton - 19 3/4 in	20.000 kg - 500 mm	7	18	3-1/2	9	7.150
20 ton - 19 3/4 in	20.000 kg - 500 mm	8	20	4	10	7.899
20 ton - 19 3/4 in	20.000 kg - 500 mm	10	25	5	13	9.772
20 ton - 19 3/4 in	20.000 kg - 500 mm	12	30	6	15	11.647
20 ton - 19 3/4 in	20.000 kg - 500 mm	14	36	7	18	13.897

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete  
Reinforcement 2 pcs. of U-bars Ø6 mm x 800 mm in the area of the spherical anchor

To recalculate the safe working load when the anchor is used in a lower strength concrete, multipl the tabulated safe working load by the following reduction factors:

Concrete strength	Reduction factor
2.000 psi	.66
2.500 psi	.74
3.000 psi	.81
3.500 psi	.88
4.000 psi	.94
4.500 psi	1.00

Tensile Safe Working Load per Anchor - Actual corner distance								
30 cm / kg	18" / lbs	46 cm / kg	24" / lbs	61 cm / kg	36" / lbs	91 cm / kg	45" / lbs	114 cm / kg
1.776	6.575	2.984	6.575	2.984	6.575	2.984	6.575	2.984
1.924	4.958	2.250	4.958	2.250	4.958	2.250	4.958	2.250
2.219	4.889	2.219	4.889	2.219	4.889	2.219	4.889	2.219
2.664	5.870	2.664	5.870	2.664	5.870	2.664	5.870	2.664
2.959	6.520	2.959	6.520	2.959	6.520	2.959	6.520	2.959
3.699	8.150	3.699	8.150	3.699	8.150	3.699	8.150	3.699
4.438	9.779	4.438	9.779	4.438	9.779	4.438	9.779	4.438
1.775	3.911	1.775	3.911	1.775	3.911	1.775	3.911	1.775
1.963	4.325	1.963	4.325	1.963	4.325	1.963	4.325	1.963
2.219	11.486	5.213	11.486	5.213	11.486	5.213	11.486	5.213
4.359	9.605	4.359	9.605	4.359	9.605	4.359	9.605	4.359
5.419	11.940	5.419	11.940	5.419	11.940	5.419	11.940	5.419
5.419	11.940	5.419	11.940	5.419	11.940	5.419	11.940	5.419
5.419	11.940	5.419	11.940	5.419	11.940	5.419	11.940	5.419

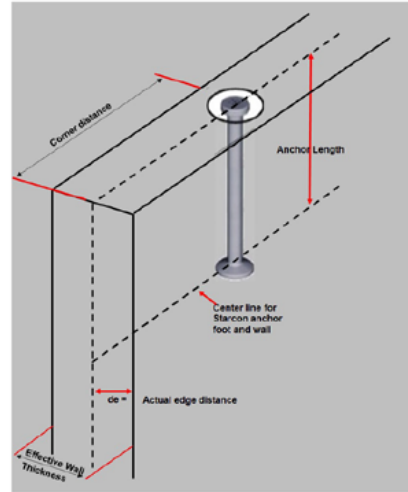
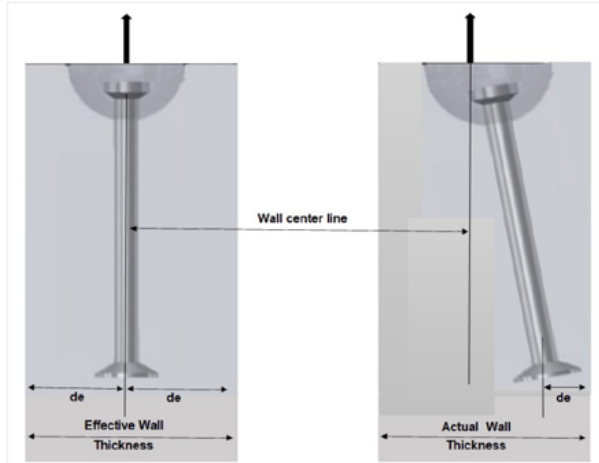
Tensile Safe Working Load per Anchor - Actual corner distance								
25 cm / kg	16" / lbs	41 cm / kg	24" / lbs	61 cm / kg	30" / lbs	76 cm / kg	42" / lbs	107 cm / kg
3.074	6.958	3.158	9.552	4.335	9.552	4.335	9.552	4.335
3.245	7.399	3.358	10.114	4.590	10.114	4.590	10.114	4.590
3.585	8.721	3.958	11.288	5.123	11.288	5.123	11.288	5.123
4.435	10.656	4.836	14.271	6.477	14.271	6.477	14.271	6.477
5.286	12.555	5.698	17.316	7.859	17.316	7.859	17.316	7.859
6.307	15.554	7.059	21.060	9.558	21.060	9.558	21.060	9.558

## Starcon anchor effective tensile capacity

### When anchors are used in groups and in thin walls

Starcon anchors, listed below, must be located the minimum distance away from a corner with the anchor foot being positioned at the center line of the wall. The anchor head location may be off center, however, any eccentricity of the foot will result in a reduction of the safe working load. When the anchor foot is not positioned at the center line of the wall, the effective wall thickness is equal to twice the actual edge distance.

To develop the safe working load of Starcon anchor, the minimum spacing between two anchors is six times the anchor length.



Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		18" / lbs
Standard	Metric	in	cm	in	cm	
2 ton - 6 3/4 in	1.875 kg - 170 mm	3	8	1-1/2	4	1.313
2 ton - 6 3/4 in	1.875 kg - 170 mm	3-1/4	8	1-5/8	4	1.313
2 ton - 6 3/4 in	1.875 kg - 170 mm	3-1/2	9	1-3/4	4	1.481
2 ton - 6 3/4 in	1.875 kg - 170 mm	4	10	2	5	1.644
2 ton - 6 3/4 in	1.875 kg - 170 mm	5	13	2-1/2	6	2.135
2 ton - 6 3/4 in	1.875 kg - 170 mm	6	15	3	8	2.466
2 ton - 11 in	1.875 kg - 280 mm	3	8	1-1/2	4	1.040
2 ton - 11 in	1.875 kg - 280 mm	3-1/4	8	1-5/8	4	1.040
2 ton - 11 in	1.875 kg - 280 mm	3-1/2	9	1-3/4	4	1.170
2 ton - 11 in	1.875 kg - 280 mm	4	10	2	5	1.300
2 ton - 11 in	1.875 kg - 280 mm	5	13	2-1/2	6	1.690
2 ton - 11 in	1.875 kg - 280 mm	6	15	3	8	1.950

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete.

To recalculate the safe working load when the anchor is used in a lower strength concrete, multiply the tabulated safe working load by the following reduction factors:

Concrete strength	Reduction factor
2.000 psi	.66
2.500 psi	.74
3.000 psi	.81
3.500 psi	.88
4.000 psi	.94
4.500 psi	1.00

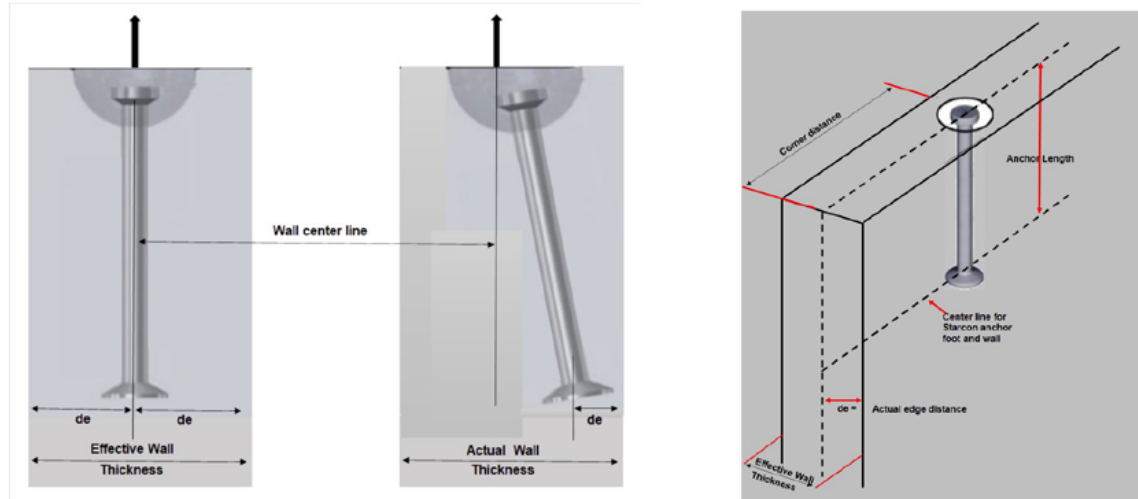
Tensile Safe Working Load per Anchor - Actual corner distance								
46 cm / kg	24" / lbs	61 cm / kg	30" / lbs	76 cm / kg	36" / lbs	91 cm / kg	48" / lbs	122 cm / kg
596	1.571	713	1.829	830	2.087	947	2.618	1.188
596	1.571	713	1.829	830	2.087	947	2.618	1.188
672	1.767	802	2.058	934	2.347	1.065	2.944	1.336
746	1.965	892	2.287	1.038	2.607	1.183	3.272	1.485
969	2.554	1.159	2.970	1.348	3.389	1.538	4.255	1.931
1.119	2.948	1.338	3.428	1.556	3.911	1.775	4.907	2.227
472	1.207	548	1.375	624	1.542	700	1.895	860
472	1.207	548	1.375	624	1.542	700	1.895	860
531	1.357	616	1.547	702	1.734	787	2.135	969
590	1.509	685	1.719	780	1.939	880	2.360	1.071
767	1.961	890	2.234	1.014	2.505	1.137	3.067	1.392
885	2.263	1.027	2.576	1.169	2.891	1.312	3.539	1.606

## Starcon anchor effective tensile capacity

### When anchors are used in groups and in thin walls

Starcon anchors, listed below, must be located the minimum distance away from a corner with the anchor foot being positioned at the center line of the wall. The anchor head location may be off center, however, any eccentricity of the foot will result in a reduction of the safe working load. When the anchor foot is not positioned at the center line of the wall, the effective wall thickness is equal to twice the actual edge distance.

To develop the safe working load of Starcon anchor, the minimum spacing between two anchors is six times the anchor length.



Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		18" / lbs
Standard	Metric	in	cm	in	cm	
4 ton - 9 1/2 in	3.750 kg - 240 mm	3-3/4	10	1-7/8	5	1.937
4 ton - 9 1/2 in	3.750 kg - 240 mm	4	10	2	5	1.937
4 ton - 9 1/2 in	3.750 kg - 240 mm	5	13	2-1/2	6	2.516
4 ton - 9 1/2 in	3.750 kg - 240 mm	6	15	3	8	2.902
4 ton - 9 1/2 in	3.750 kg - 240 mm	7	18	3-1/2	9	3.484
4 ton - 9 1/2 in	3.750 kg - 240 mm	8	20	4	10	3.871
4 ton - 19 in	3.750 kg - 480 mm	3-3/4	10	1-7/8	5	1.970
4 ton - 19 in	3.750 kg - 480 mm	4	10	2	5	1.970
4 ton - 19 in	3.750 kg - 480 mm	5	13	2-1/2	6	2.787
4 ton - 19 in	3.750 kg - 480 mm	6	15	3	8	3.008
4 ton - 19 in	3.750 kg - 480 mm	7	18	3-1/2	9	3.741
4 ton - 19 in	3.750 kg - 480 mm	8	20	4	10	4.045

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete.



To recalculate the safe working load when the anchor is used in a lower strength concrete, multiply the tabulated safe working load by the following reduction factors:

Concrete strength	Reduction factor
2,000 psi	.66
2,500 psi	.74
3,000 psi	.81
3,500 psi	.88
4,000 psi	.94
4,500 psi	1.00

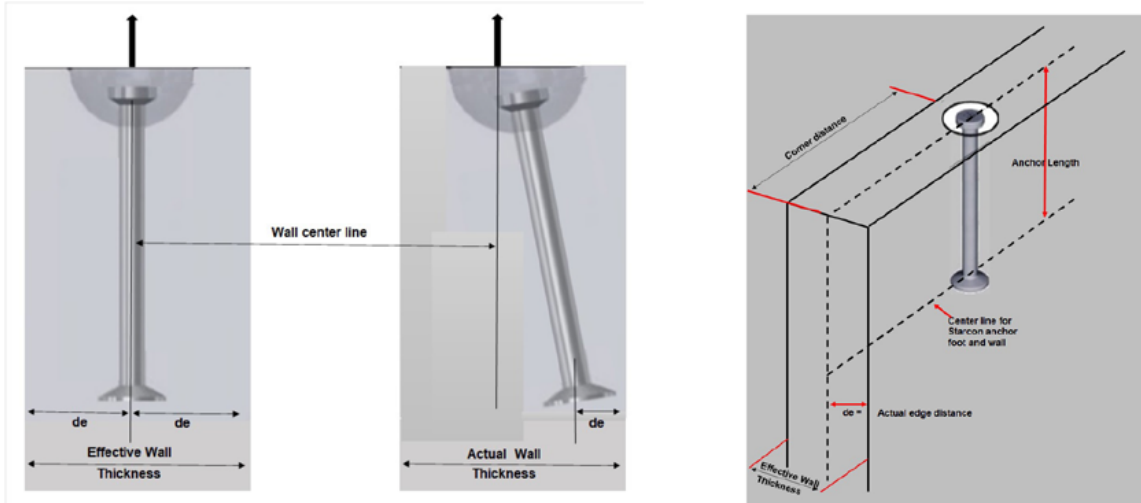
Tensile Safe Working Load per Anchor - Actual corner distance								
46 cm / kg	24" / lbs	61 cm / kg	36" / lbs	91 cm / kg	48" / lbs	122 cm / kg	60" / lbs	152 cm / kg
879	2.261	1.026	2.908	1.320	3.581	1.625	4.228	1.919
879	2.261	1.026	2.908	1.320	3.581	1.625	4.228	1.919
1.142	2.937	1.333	3.781	1.716	4.654	2.112	5.497	2.495
1.317	3.389	1.538	4.363	1.980	5.370	2.437	6.341	2.878
1.581	4.067	1.846	5.235	2.376	6.443	2.924	7.611	3.454
1.757	4.521	2.052	5.817	2.640	7.159	3.249	8.457	3.838
894	2.767	1.256	3.149	1.429	3.717	1.687	4.475	2.031
894	2.767	1.256	3.213	1.458	3.717	1.687	4.475	2.031
1.265	3.228	1.465	4.506	2.045	4.988	2.264	5.687	2.581
1.365	3.722	1.689	4.991	2.265	5.724	2.598	6.725	3.052
1.698	4.623	2.098	5.504	2.498	6.958	3.158	7.926	3.597
1.836	4.702	2.134	6.264	2.843	7.317	3.321	7.978	3.621

## Starcon anchor effective tensile capacity

### When anchors are used in groups and in thin walls

Starcon anchors, listed below, must be located the minimum distance away from a corner with the anchor foot being positioned at the center line of the wall. The anchor head location may be off center, however, any eccentricity of the foot will result in a reduction of the safe working load. When the anchor foot is not positioned at the center line of the wall, the effective wall thickness is equal to twice the actual edge distance.

To develop the safe working load of Starcon anchor, the minimum spacing between two anchors is six times the anchor length.



Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		12" / lbs
Standard	Metric	in	cm	in	cm	
8 ton - 13-3/8 in	7.500 kg - 340 mm	4-3/4	12	2-3/8	6	3.845
8 ton - 13-3/8 in	7.500 kg - 340 mm	5	13	2-1/2	6	3.845
8 ton - 13-3/8 in	7.500 kg - 340 mm	6	15	3	8	4.160
8 ton - 13-3/8 in	7.500 kg - 340 mm	7	18	3-1/2	9	4.482
8 ton - 13-3/8 in	7.500 kg - 340 mm	8	20	4	9	4.700
8 ton - 13-3/8 in	7.500 kg - 340 mm	10	25	5	13	5.299
8 ton - 13-3/8 in	7.500 kg - 340 mm	12	30	6	15	5.881
8 ton - 26-3/4 in	7.500 kg - 680 mm	4-3/4	12	2-3/8	6	4.021
8 ton - 26-3/4 in	7.500 kg - 680 mm	5	13	2-1/2	6	4.140
8 ton - 26-3/4 in	7.500 kg - 680 mm	6	15	3	8	4.376
8 ton - 26-3/4 in	7.500 kg - 680 mm	7	18	3-1/2	9	4.735
8 ton - 26-3/4 in	7.500 kg - 680 mm	8	20	4	9	4.975
8 ton - 26-3/4 in	7.500 kg - 680 mm	10	25	5	13	5.586
8 ton - 26-3/4 in	7.500 kg - 680 mm	12	30	6	15	5.806

Capacity x Length		Effective wall thickness 2 (de)		Actual edge distance (de)		10" / lbs
Standard	Metric	in	cm	in	cm	
20 ton - 19 3/4 in	20.000 kg - 500 mm	6-1/2	17	3-1/4	8	4.440
20 ton - 19 3/4 in	20.000 kg - 500 mm	7	18	3-1/2	9	4.550
20 ton - 19 3/4 in	20.000 kg - 500 mm	8	20	4	10	4.773
20 ton - 19 3/4 in	20.000 kg - 500 mm	10	25	5	13	7.981
20 ton - 19 3/4 in	20.000 kg - 500 mm	12	30	6	15	8.554
20 ton - 19 3/4 in	20.000 kg - 500 mm	14	36	7	18	9.259

SWL's provide a factor of safety of approximately 4 to 1 in 4,500 psi normal weight concrete.

To recalculate the safe working load when the anchor is used in a lower strength concrete, multiply the tabulated safe working load by the following reduction factors:

Concrete strength	Reduction factor
2.000 psi	.66
2.500 psi	.74
3.000 psi	.81
3.500 psi	.88
4.000 psi	.94
4.500 psi	1.00

Tensile Safe Working Load per Anchor - Actual corner distance								
30 cm / kg	18" / lbs	46 cm / kg	24" / lbs	61 cm / kg	36" / lbs	91 cm / kg	45" / lbs	114 cm / kg
1.745	4.059	1.842	4.257	1.932	4.658	2.114	4.964	2.253
1.745	4.059	1.842	4.257	1.932	4.658	2.114	4.964	2.253
1.888	4.429	2.010	4.682	2.125	5.187	2.354	5.572	2.529
2.034	4.808	2.182	5.114	2.321	5.724	2.598	6.194	2.811
2.133	5.063	2.298	5.407	2.454	6.090	2.764	6.615	3.002
2.405	5.771	2.619	6.211	2.819	7.095	3.220	7.774	3.528
2.669	6.456	2.930	6.996	3.175	8.073	3.664	8.899	4.039
1.825	4.118	1.869	4.325	1.963	4.618	2.096	4.843	2.198
1.879	4.305	1.954	4.471	2.029	4.786	2.172	5.028	2.282
1.986	4.572	2.075	4.757	2.159	5.125	2.326	5.407	2.454
2.149	4.971	2.256	5.193	2.357	5.638	2.559	5.980	2.714
2.258	5.240	2.378	5.709	2.591	5.982	2.715	6.363	2.888
2.535	5.918	2.686	6.231	2.828	6.857	3.112	7.335	3.329
2.635	6.269	2.845	6.994	3.174	7.423	3.369	7.974	3.619

Tensile Safe Working Load per Anchor - Actual corner distance								
25 cm / kg	16" / lbs	41 cm / kg	24" / lbs	61 cm / kg	30" / lbs	76 cm / kg	42" / lbs	107 cm / kg
2.015	4.691	2.129	5.004	2.271	5.240	2.378	8.481	3.849
2.065	7.463	3.387	7.796	3.538	8.045	3.651	8.675	3.937
2.166	7.712	3.500	8.086	3.670	8.364	3.796	11.585	5.258
3.622	8.355	3.792	8.825	4.005	11.821	5.365	15.195	6.896
3.882	9.010	4.089	12.224	5.548	15.305	6.946	18.826	8.544
4.202	9.814	4.454	13.152	5.969	16.316	7.405	20.035	9.093


## Starcon Ring Clutch userguide

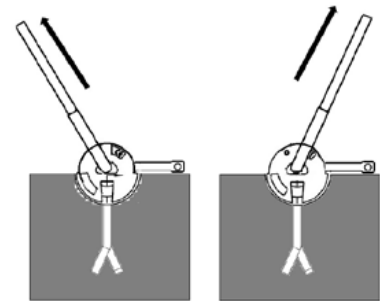
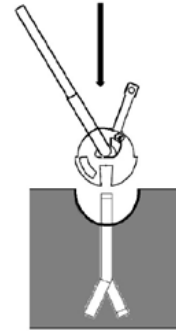
Part code	Description	Load group t
99.1560009525J	Starcon ring clutch	2-3T/6000 lbs
99.1560009550J	Starcon ring clutch	4-6T/12000 lbs
99.15600095100J	Starcon ring clutch	8-11T/22000 lbs



### Engaging

Insert the Starcon ring clutch in the recess in the concrete and close the locking bolt manually. Push it to the limit position and ensure that the handle for the locking bolt is parallel with the concrete surface.

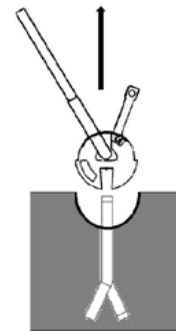
 Operator must insure locking bolt handle remains parallel with concrete during lift.



### Handling

The Starcon ring clutch can be subjected to loads in any direction, but do not exceed the load limit of the anchor. It is important to follow the instructions regarding the reinforcement in the concrete.

When the ring clutch has been connected to the anchor, the coupling link can move in any direction, even under load.



### Release

Push back the bolt manually (by hand) and release the ring clutch.

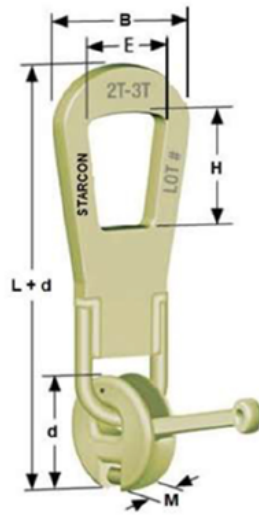
### Marking

Starcon ring clutch is marked with Load group, and ID batch number.

Every Starcon ring clutch has been tested with 2 x working load.

The Starcon ring clutch must be inspected every 12 months.

## Inspection of Starcon Ring Clutch



Part code	Load group	L		M		d		H		E		B		Weight	
		inch"	mm	inch"	mm	inch"	mm	inch"	mm	inch"	mm	inch"	mm	lbs	kg
99.1560009525J	2 - 3T	10-5/16"	262	1-1/8"	28	3"	80	2-3/4"	68	2-1/4"	54	3-3/4"	90	3,65	1,66
99.1560009550J	4 - 6T	13-1/4"	337	1-7/16"	36	4-1/8"	104	4-1/2"	87	2-5/8"	64	4-7/16"	114	7,85	3,56
99.15600095100J	8 - 11T	16-1/2"	419	2"	50	5-5/16"	150	5-3/8"	161	3"	90	5-1/2"	155	20,05	9,09

Part code	Load group	Allowable tension load (5:1)		Ultimate capacity in tension	
		lbs	kg	lbs	kg
99.1560009525J	2 - 3T	6.000	2.722	30.000	13.608
99.1560009550J	4 - 6T	12.000	5.443	60.000	27.216
99.15600095100J	8 - 11T	22.000	9.979	110.000	49.895

## Limitations in use Starcon Ring Clutch

The Starcon Ring Clutch must only be used for the designed purpose. If there are any queries on its use contact the supervising officer before use.

The Starcon Ring Clutch must only be fitted in a compatible anchor with compatible load group.

A Starcon Ring Clutch which is rusted, corroded or damaged must not be used.

The Starcon Ring Clutch must not be used for lifting more than the permissible load.

The Starcon Ring Clutch must never be used for lifting of people.

The Starcon Ring Clutch can be used in temperatures from  $-10^{\circ}\text{C}$  up to  $+45^{\circ}\text{C}$ .

## Warnings

Make sure that the locking bolt of the Starcon Ring Clutch is always in contact with the concrete during lifting and handling.

Lifting equipment must be approved to lift at least the maximum used load + the net weight of the Starcon lifting and handling system + any additional lifting equipment.

The lifting process must be calm, no sudden jerks or direction changes with the lifting equipment during movement, as this can lead to pendulum effect on the load which could result in a crush risk to personnel or the load being dropped.

If there is a potential risk between the load, building parts, machines etc. the operator personnel may not remain within the movement area of the load.

The working area of the operator must be level and without obstacles on the ground which could be a stumbling risk.

No alterations or adjustments to the Starcon Ring Clutch are permitted when the system is in a load condition.

The Starcon Ring Clutch must not be released or removed until the load has been placed on a secure foundation, which can bear the load, and the concrete product is secured so it cannot fall or be a risk to personnel in the working area.

Prior to each lift it must be secured, that both the Starcon Ring Clutch and the compatible anchor which is casted in the concrete product, is free of dirt.

Do not place arms, feet or other body parts under a concrete product or in close proximity to the Starcon Ring Clutch or coupling link.

The concrete product must never be dragged, only lifted.



NEVER make any changes on the Starcon Ring Clutch without written permission from the manufacturer.

The operator must always ensure that the connection between the lifting equipment, and/or any possible lifting tools and the Starcon Ring Clutch is correct and secured against accidental de-coupling.

The operator must always ensure that the connection between the Starcon Ring Clutch and the compatible anchor in the concrete product is correct and secured against accidental de-coupling.

The operator must always confirm that the connection between the Starcon Ring Clutch and the compatible anchor in the concrete product is correct and secured against accidental de-coupling.

Staying and travel under hanging load is not allowed.

Always use gloves and safety shoes during handling.

Do not use a Starcon Ring Clutch with visible defects and faults such as wear and tear, deformations, rust damages etc.

## Maintenance and inspection

Please see also "Inspection of Starcon Ring Clutch".

All maintenance must take place when the Starcon Ring Clutch is de-coupled and in a no-load condition.

The Starcon Ring Clutch must be inspected and maintained, in order to keep it in good condition during use.

After use the Starcon Ring Clutch should be cleaned and inspected for defects and faults. In case of defects, these must be repaired or the Starcon lifting eye must be discarded.

The Starcon Ring Clutch should always be stored in a dry and airy place.

A damaged, rust damaged or corroded Starcon Ring Clutch must not be used.

Every 12. months the Starcon Ring Clutch must go through a statutory inspection by an approved lifting equipment service technician.



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Starcon is an internationally recognized brand in the supply of lifting systems to the precast industry.

Starcon comprises the full range of lifting systems along with fully guaranteed technical back up service.

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LIFTING EQUIPMENT AND CONCRETE ACCESSORIES

Phone: 866 303 3103

Mobile: 416 836 0905

[www.landconproducts.com](http://www.landconproducts.com)

email: [jason@landconproducts.com](mailto:jason@landconproducts.com)

180 Steeles Ave. W, Suite 206, Thornhill, ON L4J 2L1

**CERTEX** | Lifting Solutions Group  
Axial Johnson International

Nyvang 16, 2. tv  
DK-5500 Middelfart  
Tlf.: +45 74 54 14 37 8

Virkelyst 17b  
DK-9400 Nørresundby  
Tlf.: +45 98 13 18 88

Jernholmen 43-47D  
DK-2650 Hvidovre  
Tlf.: +45 36 77 40 30

Olievej 4  
DK-6700 Esbjerg  
Tlf.: +45 75 13 08 44

CERTEX Danmark A/S  
Trekanten 6-8  
DK-6500 Vojens  
Tlf.: +45 74 54 14 37  
E-mail: [info@certex.dk](mailto:info@certex.dk)  
[www.certex.dk](http://www.certex.dk)