

## STARCON



### Lifting loop - 0.5S to 4S

Lifting and handling systems for concrete elements.

User and design manual

## 1 Nomenclature

Symbol	Description	Unit
$\sigma_{ele}$	Concrete strength of the element at the time of lifting	<i>MPa</i>
$d_s$	Diameter of Lifting loop	<i>mm</i>
$SF$	Safety factor	—
$S$	Load group symbol (STARCON)	—
$WLL$	Working Load limit	<i>tonne</i>

Table 1 Nomenclature

## Starcon Precast Concrete Design & Lifting Manual

1	Nomenclature .....	1
2	Identification.....	2
3	Introduction Lifting Loop - 0.4S to 4S .....	3
4	Safety instructions before use .....	4
5	Advantages of the Starcon system. ....	4
6	Using the Lifting Loop system .....	5
7	Safety factors for Lifting loop systems:.....	7
8	General information .....	8
9	Misuse of the lifting loop .....	9
10	Checking connection fittings.....	11
11	General safety information when using the Starcon system.....	12
12	Maintenance and inspection .....	14
13	Disposal / Recycling .....	15
14	Product data of Lifting loop .....	15
15	Product data of Alpha inclined pull lifting loop .....	16
16	Product data of Goliath Lifting Loop with thread .....	17
17	EC – Declaration of Conformity of the Machinery.....	18

## 2 Identification

Table 2 provides insight into the revision number of this document. It facilitates tracking changes and ensuring version control for accurate referencing and updates.

Version	Responsible	Creator	Date	Comment
A	CERTEX Denmark	JLJ	13-02-2025	New documentation

Table 2 Revision table

## 3 Introduction Lifting Loop - 0.4S to 4S

**Read this instruction manual before using the spherical anchor. Incorrect use can cause injury or danger!**

*Safety is paramount when using lifting devices and equipment.*

*Only trained individuals should operate them as per national law.*

*Familiarize yourself with the instruction manual before using the Starcon lifting system to ensure safe operation.*

*Adhering to these guidelines reduces the risk of accidents.*

*Consult relevant national regulations as they may supersede these instructions.*

*All individuals involved with the equipment must read and understand this manual.*

*Always keep the manual with the product. Contact information is provided on the last page.*

*Contact Certex for assistance or clarification.*

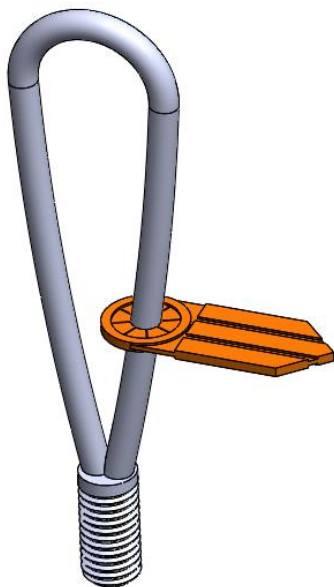


### **General concept of the use Lifting loops:**

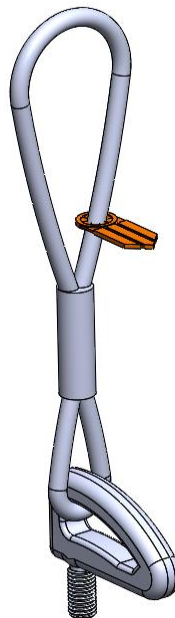
The Lifting Loop is available in three different variants: one Lifting loop with threaded end and two Lifting loops with forged head, as shown in Figure 1.

The Lifting Loop and systems use the guidelines described in the German guidelines VDI/BV-BS 6205 and Technical Report CEN/TR 15728, combined with EN 13155-2009. This ensures the highest level of safety when using our products.

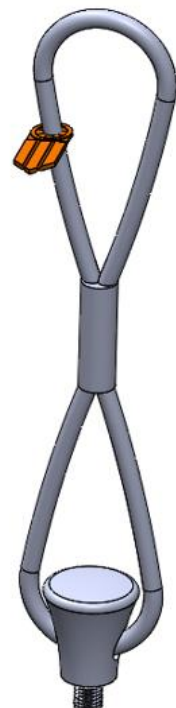
<b>Material:</b>	Galvanized steel wire	(GSW).
<b>Surface treatment:</b>	Electro galvanized	(Corrosion class: C3, ISO 12944).



Lifting loop



Alpha inclined pull lifting loop



Goliath Lifting Loop with thread

Figure 1 Starcon lifting system.

## 4 Safety instructions before use



- Lifting Loops that are exposed to corrosion, or damaged must not be used.
- The Lifting Loop must only fully screwed into the lifting anchor of the same size
- The Lifting Loop can be connected directly to a lifting hook with the same weight rating.
- The Starcon lifting and handling system must not be used to lift more than the specified load.
- The Starcon lifting and handling system must not be used for personnel lifting.
- The Starcon products are designed for one-time lifting only.
- The Starcon lifting system must only be used by skilled, trained employees.
- A lifting accessory used with the lifting eye must be correctly marked and approved for lifting.
- Before use, check the weather conditions. Never operate the system if there is a likelihood of lightning in the area and avoid use in extreme weather conditions such as storms, heavy rain, or snowing.
- The concrete safety factor assumes a factory production control complying with EN13369. If these requirements are not fulfilled, a safety factor of  $\gamma = 2,5$  shall be used.
- All relevant concrete failure modes shall be verified by the pre casting manufacturer of the concrete elements; the different failure modes and verification methods are specified in EN13155 (Annex H).

## 5 Advantages of the Starcon system.

Starcon Systems offers lifting loops that are economical, highly flexible and have a long service life. These lifting loops are used in threaded systems to lift and transport precast concrete components. This device complies with strict safety standards and is designed to ensure safe and efficient lifting operations.

The Starcon system is available in load groups 0.4S to 4S. The lifting loop with threaded end is designed to facilitate the transport and lifting of precast concrete elements, accommodating axial and diagonal pulls up to 45°. However, in situations where lateral pull is involved, it is imperative to use lifting loops with forged head to ensure safety and stability during the transport and lifting process.

The system's efficiency has been proven through many years of successful use and numerous laboratory tests. Components are regularly tested during production and are clearly marked with the maximum load. The Lifting loops are individually tested and come with a traceability batch code.

### 5.1 Note

The information in this manual is for guidance only, and the use of the manual does not in any way exempt the manufacturer from ensuring that the chosen lifting system is suitable for the intended purpose. The information and data listed in this manual only refer to original Starcon products supplied by *CERTEX DANMARK A/S*.

## 6 Using the Lifting Loop system

The Starcon system comprises a wide range of Lifting loops in a load group from 0.4 to 4S per Lifting loop with various lengths. The principle for using the system is the same for the entire range.

### 6.1 Starcon massive transport anchor

The Starcon massive transport anchor is a steel embedded member with a specially designed foot for secure anchoring in hardened concrete. The Starcon massive transport anchor head, a cylindrical, internally threaded unit, connects to the Lifting Loop. Starcon massive transport anchors are clearly labelled with dimensions (e.g. 0.4S) and are available in a variety of lengths. They undergo specimen testing for defects, dimensional deviation and tensile strength with a minimum safety factor of 3:1 against metal failure.

### 6.2 Starcon Nailing plate

The nailing plate, typically made of round plastic components with a threaded end, must be carefully attached to the anchor head and positioned correctly before being securely fastened to the formwork. After the concrete cures and hardens, the nailing plate is removed, exposing the anchor head seated in a cylindrical depression. Since the nailing plate is typically stripped and unscrewed during removal, it's not normally reusable.

### 6.3 Lifting Loop

Lifting Loops are devices used to attach slings or wire loops to objects for lifting. Typically made of forged steel, they come in various shapes and sizes to suit different lifting capacities and applications. Lifting Loops undergo rigorous testing to ensure their safety. They are tested to twice their allowable load, and all test results are meticulously recorded. Each loop is marked with its article number, identification number, and maximum working load, along with a clear indication of a 4:1 safety factor. Additionally, a certificate is issued with every delivery for complete documentation. Table 3 for load capacity of the lifting loop with threaded end.



Designation	Load group lifting loop with threaded end	Load class massive transport anchors	Load capacity lifting loop in all directions [kN] ①.
			 
			Axial load      Diagonal load ≤ 45°
Lifting loop 0.5S	0.5S	0.5S	9
Lifting loop 1.2S	1.2S	1.2S	17
Lifting loop 2S	2S	2S	31
Lifting loop 2.5S	2.5S	2.5S	39
Lifting loop 4S	4S	4S	50
① The lifting loop system operates based on the load capacity of the massive transport anchor, ensuring safe and efficient handling of loads up to the specified limit of the anchor's capability.			

Table 3 Load capacity of the lifting loop with threaded end

Table 4 for load capacity of the lifting loop with forged head.



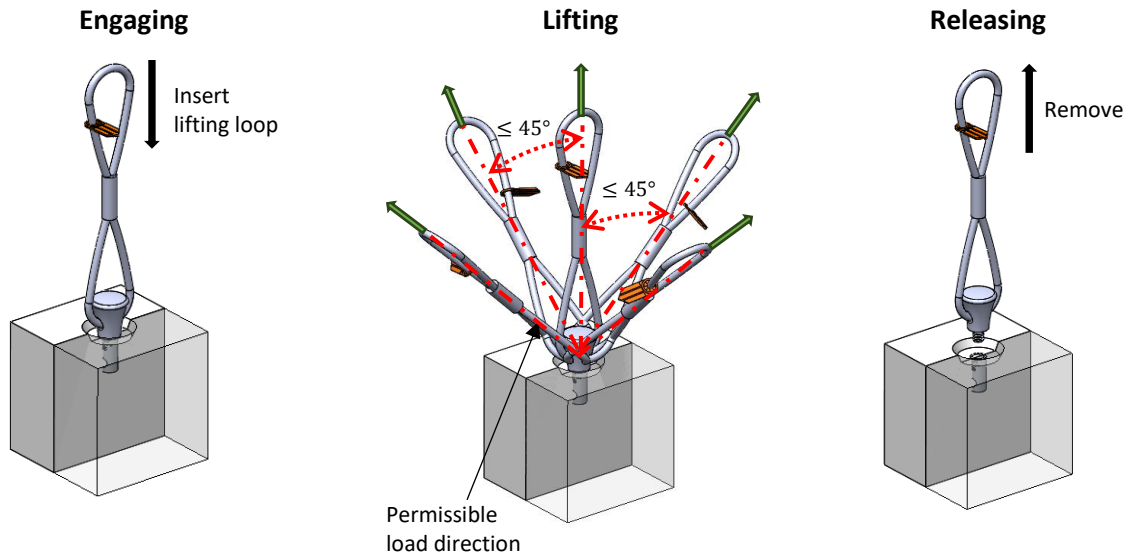
Designation	Load group lifting loop with forged head	Load class massive transport anchors	Load capacity lifting loop in all directions [kN] ①.	
			 Axial load	 Diagonal load ≤ 45°
Lifting loop 0.4S	0.4	0.4	13	6,5
Lifting loop 0.5S	0.5S	0.5S	17	8,5
Lifting loop 1.2S	1.2S	1.2S	23	11,5
Lifting loop 2S	2S	2S	44	22
Lifting loop 2.5S	2.5S	2.5S	55	27,5
Lifting loop 4S	4S	4S	72	36
① The lifting loop system operates based on the load capacity of the massive transport anchor, ensuring safe and efficient handling of loads up to the specified limit of the anchor's capability.				

Table 4 Load capacity of the lifting loop with forged head

### 6.4 Lifting loop assembly instructions.

Screw the lifting loop by hand into the threaded hole of the massive transport anchor. Ensure the threads engage fully and easily without any cross-threading. If necessary for proper sling alignment during lifting, you may loosen the connection by one turn of the lifting loop. The system allows safe lifting in a vertical direction and up to a maximum tilt angle of 45 degrees in all directions. It is not to be used for turning or pitching a load. The instruction is shown and explained in Table 5.



Verify that the massive transport anchor load capacity matches the Lifting loop.

Manually insert the Lifting loop into the massive transport anchor.

Once hand-tight, visually check that the Lifting loop sits flush against the massive transport anchor. You can begin the lifting process.

Lifting loops are designed to handle loads in vertical and tilted orientations, provided the load limits of the massive transport anchors are not exceeded. The tilt lift should normally not exceed 45 degrees in all directions. When using a spreader beam, the tilt angle of the load can be reduced.

Manually disconnect the Lifting loop by turning it out of the massive transport anchor.

Table 5 The connection between the lifting loop and massive transport anchor.

## 7 Safety factors for Lifting loop systems:

For the calculations of the Lifting loop system, the following safety factors shown Table 6 have been applied to ensure its reliability and safety. These factors, in accordance with the recommendation of EN13155, have been carefully selected as guidelines to ensure optimal safety during the system's operation.

Failure safety factors	
Steel failure of Lifting loop	$SF_{Steel} = 3$
Concrete pull out failure	$SF_{concrete} = 2,5$
Failure in the lifting hook	$SF_{Link} = 4$

Table 6 Failure safety factors



## 8 General information

This section provides essential details on the Lifting Loop systems, offering clarity and guidance for safe and efficient usage.

### 8.1 Marking on the Lifting loop

Every loop within the Schroeder lifting socket system carries a tag showing the manufacturer, thread and load group, ensuring correct identification show on Figure 2.

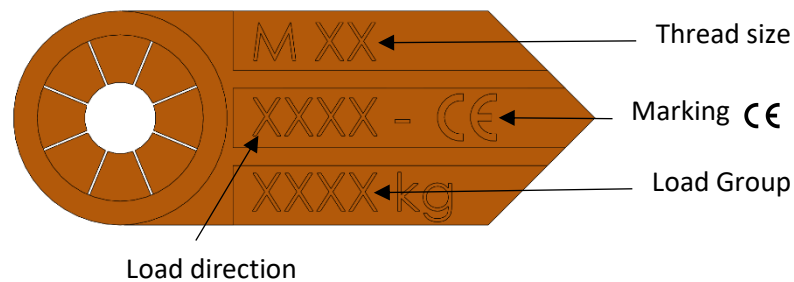


Figure 2 Marking plate attached to the Lifting loop.

### 8.2 Guidelines for Lifting loop selection

When selecting Lifting loop, it's essential to consider various factors to ensure safety and effectiveness. The tables provided contain crucial information such as maximum load capacities, edge distances, and installation values for different Lifting loop types. Key points to consider:

- Weight of the precast element.
- The number of Lifting loops.
- How the Lifting loops are arranged.
- The load-bearing capacity of the Lifting loop.
- Sling handling angle.
- The diagonal pulls properties of the Lifting loop.
- Environmental impact on the use.
- Dynamic factor.

### 8.3 Guidelines for installation

For the Lifting Loop systems to be appropriately installed, it is imperative to ensure compliance with specific technical criteria and prerequisites:

- Adherence to load capacity specifications of the Lifting loop.
- Maintaining appropriate edge spacing.
- Ensuring the concrete grade is suitable.
- Verifying alignment with the load direction.
- Additional reinforcement requirements.

### 8.4 Guideline for load capacity

Load capacity of a Lifting loop relies on several factors:

- The strength of the concrete at the moment of lifting, as determined by a cube-test with dimensions of 15 × 15 × 15 cm.
- The length of the Lifting loop.
- The spacing between the Lifting loop and the edges, both axially and along the edge.
- The direction of the applied load.
- The arrangement of reinforcement within the concrete structure.

## 9 Misuse of the lifting loop

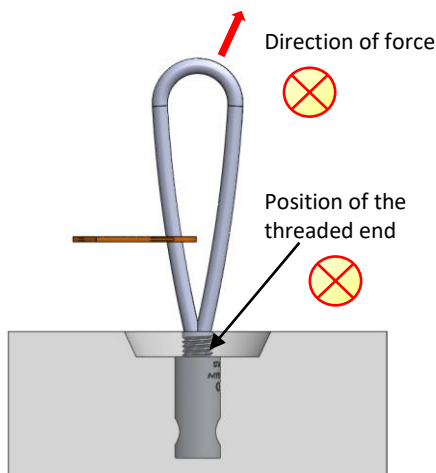
### 9.1 Lifting loop with threaded end

The Lifting Loop with threaded is designed for secure load lifting. Correct threaded end connection is crucial to prevent bending and damage, which can result in injury or death. To ensure optimal performance and safety, align the wire loop at a 45-degree angle or less when under load.

Overtightening the threaded end of lifting loop devices can cause damage, reducing their load capacity and increasing the risk of falls. This poses a significant risk to life and limb. The threaded end of lifting loops must always be hand-tightened.

The misuse of the Lifting Loop with threaded end is shown in Table 7.

To prevent bending and damage to the threaded end of the lifting loop, ensure the threaded section is screwed in fully to the last turn. No more than one thread pitch should protrude from the lifting anchor.



To prevent the wire loop from breaking, ensure that the force is applied at an angle of 45° degrees or less.

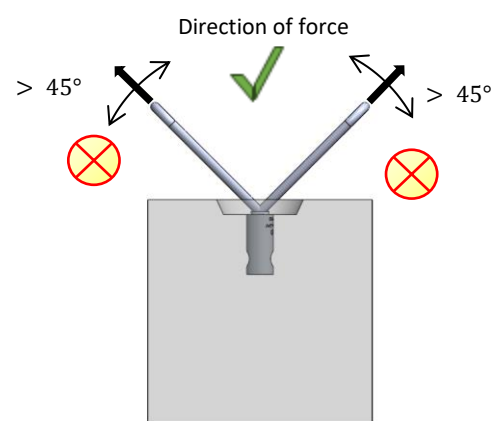
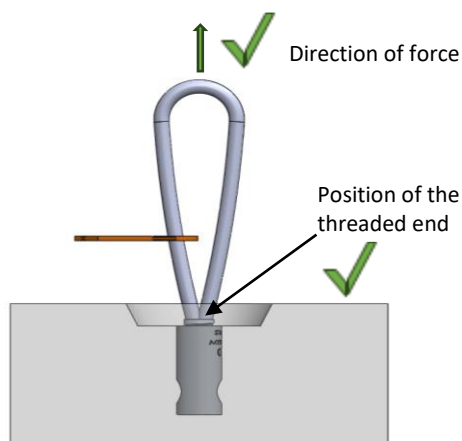
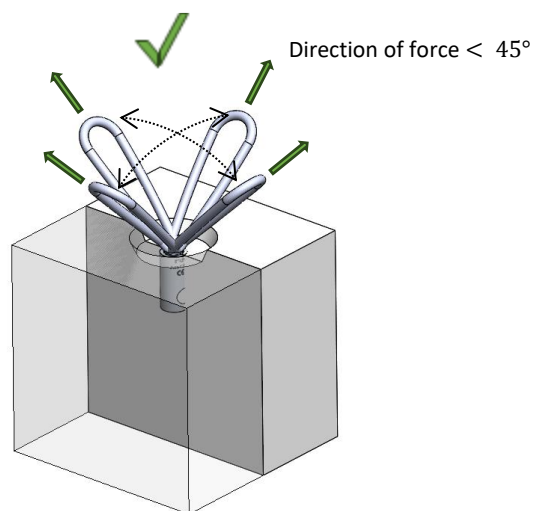


Table 7 Misuse of the Lifting Loop with threaded end

## 9.2 Lifting loop with forged head

The Lifting Loop with forged head is a lifting device that uses a threaded transport anchor system. It must be screwed securely into the threaded transport anchor until the bottom of the forged head makes contact with the pre-formed recess in the concrete element. During rigging, the wire loop of the lifting loop with forged head must always point in the direction of the tensile force. To adjust the lifting loop with forged head position, it can be unscrewed by no more than half a turn.

The misuse of the Lifting Loop with forged head is shown in Table 8.

To prevent bending and damage to the threaded end of the forged head, ensure the threaded section is screwed in fully to the last turn.

If the lifting loop is pulled towards the upper surface of the slab under load, it will bend at the edge of the slab. Loading the lifting loop with wire loop at a right angle to the forged head axis is not permitted.

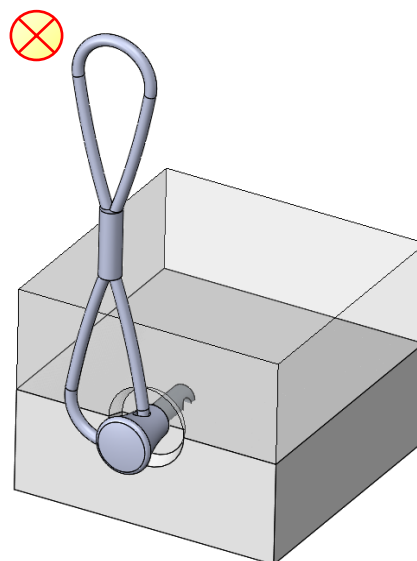
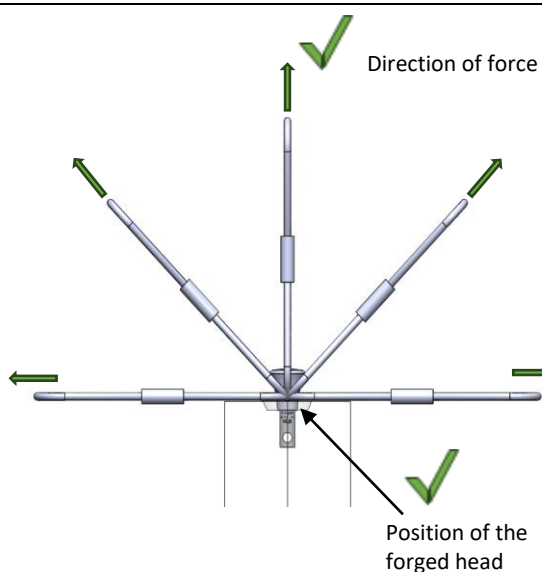
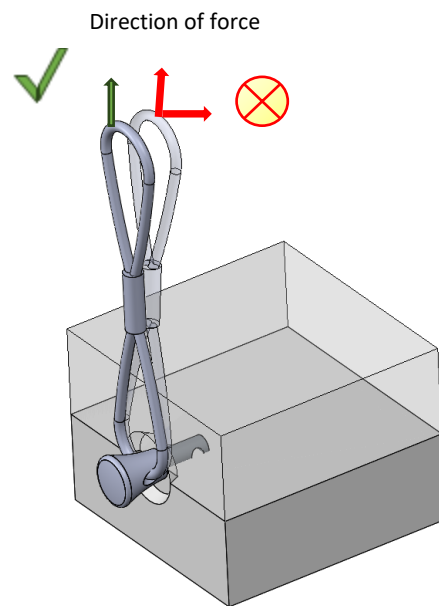
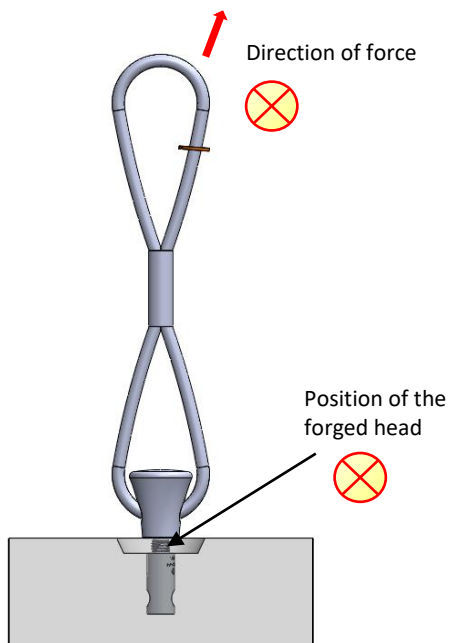


Table 8 Misuse of the Lifting Loop with forged head.

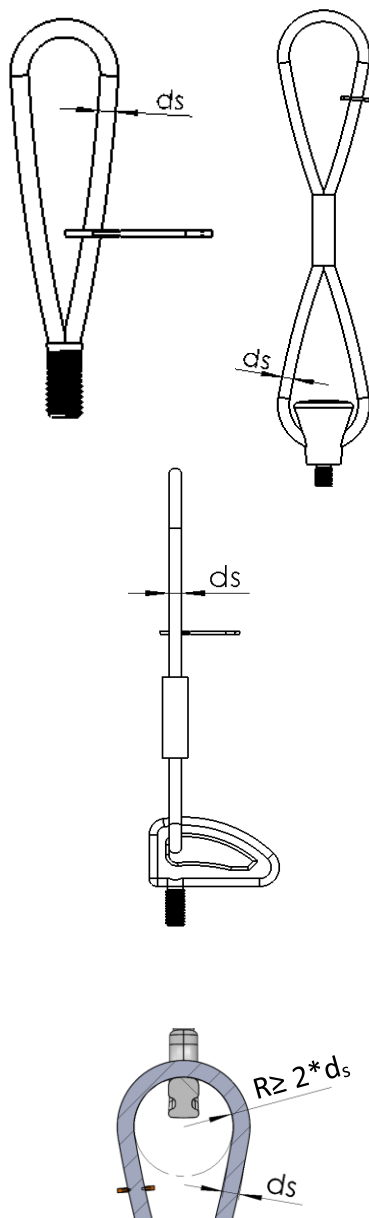
## 10 Checking connection fittings

Lifting Loop are load-bearing devices designed to work exclusively with STARCON massive transport anchor. They require an annual inspection by a qualified expert to ensure safe operation. The product's correct function and safety can only be guaranteed when using original components from STARCON. Users are cautioned against mixing products from other manufacturers. Key inspection points must be followed for maintenance shown in Table 9.

Wire cables must be regularly inspected for defects such as:

- The threaded end or forged head buckling and deformed.
- Wire loop kinking.
- Broken braids.
- Pitting due to corrosion.
- Crushing, slackening, and severe wear.
- Loose or separated connection between the cable and ferrule or sleeve.
- Thread damage.
- Connector significantly deformed or protruding.
- Specific thresholds for ruptured wires are provided for different cable types and lengths.
- Ensure cables are free from contact with corrosive substances.
- Crane hooks should have a large cross-section radius to prevent cable damage. This radius must be greater than or equal to two times the diameter of the wire rope.
- Lifting loops must be inspected annually by qualified experts, and decommissioned if deformed or excessively worn.
- Only original Lifting Loops and Anchors should be used together to ensure safety and proper function.

Decommission wire cables immediately if the following numbers of ruptured wire cables are visible.



Cable type	No. of visible ruptured wires over a length of		
	$3d_s$	$6d_s$	$30d_s$
Braided cable	4	6	16

Table 9 Checking for defects on Lifting loop.

## 11 General safety information when using the Starcon system

General safety information when using the Starcon system.



- Ensure that the marking on the Starcon lifting unit always points in the direction of pull during lifting.
- The lifting machine must be approved to lift at least the maximum applied load + the weight of the Starcon lifting and handling system + any hoisting accessories.
- Lifting movements must be smooth; no sudden or abrupt changes in direction with the lifting machine should be made during a lifting operation, as this can lead to pendulum movements of the load, causing crushing hazards or dropping of the load.
- Where there is a risk of crushing between the load and objects, building parts, machinery, etc., the operator must not be in the danger zone.
- The operator's work area must be flat and free of obstacles that could pose a tripping hazard.
- When depositing the load, the operator must ensure this accepts on a flat and stable surface.
- Only when the load has been deposited and secured the Starcon lifting unit is completely unloaded may it be released and lifted free.
- Before each lift, ensure that both the Starcon lifting unit and the Starcon lifting anchor embedded in the concrete product are free from dirt that could reduce grip.
- Never insert arms or feet under a concrete product.
- Concrete products must never be dragged, only lifted.
- No modifications to the Starcon lifting and handling system may be made without written permission from the manufacturer.
- The operator must always ensure that the connection between the lifting machine and/or any hoisting accessories and the Starcon lifting unit is correct and secured against unintentional detachment.
- The operator must always ensure that the connection between the Starcon lifting unit and the Starcon lifting anchor is correct and secured against unintentional detachment.
- Keep a safe distance and never walk under a suspended load.
- Use gloves, safety shoes and other PPE when handling.
- Never use a Starcon lifting and handling system that has visible defects such as wear, deformations, rust damage, etc.
- Most anchors are designed to be easily handled during installation without the need for lifting equipment. However, some anchors may weigh more and should be handled using lifting equipment. Please refer to the order list for the accurate weight of each product.

## 11.1 Personal Protection

Always use gloves, a safety helmet, and safety shoes as a minimum requirement when operating the equipment. Keep hands and other body parts away from the lifting stand, lifting accessories, and the load during use.



## 11.2 Preparation of the product before use

### 11.2.1 Transport and Storage

Anchors should be transported and stored safely to prevent risks to personnel and nearby objects.

### 11.2.2 Unpacking

Remove the pallet and packaging protecting the anchors.

Cut the safety straps. The person unpacking should wear gloves, safety shoes, and safety glasses when cutting the straps.

### 11.2.3 Safe Disposal of Packaging Materials

All packaging used by Certex Denmark can be reused. Pallets and all wooden packaging can be reused or recycled.

All plastic, cardboard, and paper materials should be sent to the local recycling center.

If there are no local recycling facilities, the packaging should be returned to Certex Denmark for disposal at the customer's expense.

### 11.2.4 Preparatory Work Before Installation

After unpacking, visually inspect the anchors for any damage.

### 11.2.5 Installation and Assembly

The anchors are delivered ready for use.

### 11.2.6 Storage and Protection Between Periods of Normal Use

Inspect the anchors before each use and lift. Never use anchors or lifting accessories with visible defects such as wear, deformations, corrosion damage, etc.

Always store the lifting bar indoors, in a dry and ventilated area.

### 11.2.7 Provision of Information (Users, Operators, Service Experts)

All operators or individuals within the danger zone must receive information on operating the anchors and must be trained by the supervisor, familiarizing themselves with the product and its use before lifting operations commence.

Operators must be trained in the use of the Starcon lifting product and all its functions and positioned to have a clear view of the entire lifting operation.

### 11.2.8 Placement of Instruction

All user manuals should always be stored together with the Starcon lifting product.

## 12 Maintenance and inspection

- All maintenance must be performed when the Starcon lifting unit is unloaded.
- The Starcon lifting unit should be inspected and maintained to ensure it remains in proper condition during use.
- After each use, the Starcon lifting unit should be cleaned and inspected for any faults or deficiencies.
- If any faults are found, they must be rectified, or the Starcon lifting unit should be discarded.
- The Starcon lifting unit should always be stored in a dry and well-ventilated area.
- Any damaged, corroded, or worn-out Starcon lifting unit must be immediately taken out of service and marked not be used again.
- Equipment from Starcon should undergo at least one annual inspection by a qualified skilled person to inspect lifting equipment and cranes.

### 12.1 Maintenance Schedule



- Only original spare parts may be used, and they must be replaced by a trained individual.
- The annual inspection must be carried out by a qualified individual who has received the necessary training and certification for lifting equipment.
- All services must be documented, and the data must be stored.
- If there are any visual defects or if the labeling is not present on the lifting stand, the lifting stand must be marked as "out of service".

**B** Before use

**A** After use

**M** Monthly, or a maximum of 200 hours of usage.

**Y** Annually, or after a maximum of 2400 hours of use.

Inspection	B	A	M	Y
Perform a visual inspection to check for signs of overload, deformation, damage, wear, and corrosion.	X	X	X	X
The equipment must undergo inspection.			X	
Ensure that the equipment is ready and clearly labeled.	X			X
Inspection should be carried out by a qualified individual with a report prepared.				X

Table 10 Maintenance schedule

## 13 Disposal / Recycling

This section describes the end of use for the product.

- End of use / Disposal The lifting points shall be sorted / scrapped as general steel scrap.
- The Starcon lifting and handling system should be sorted and disposed of according to appropriate material categories, including metal, plastic, etc.
- Certex can assist you with disposal if required.

## 14 Product data of Lifting loop

Figure 3 shows a measurement sketch for Lifting Loop.

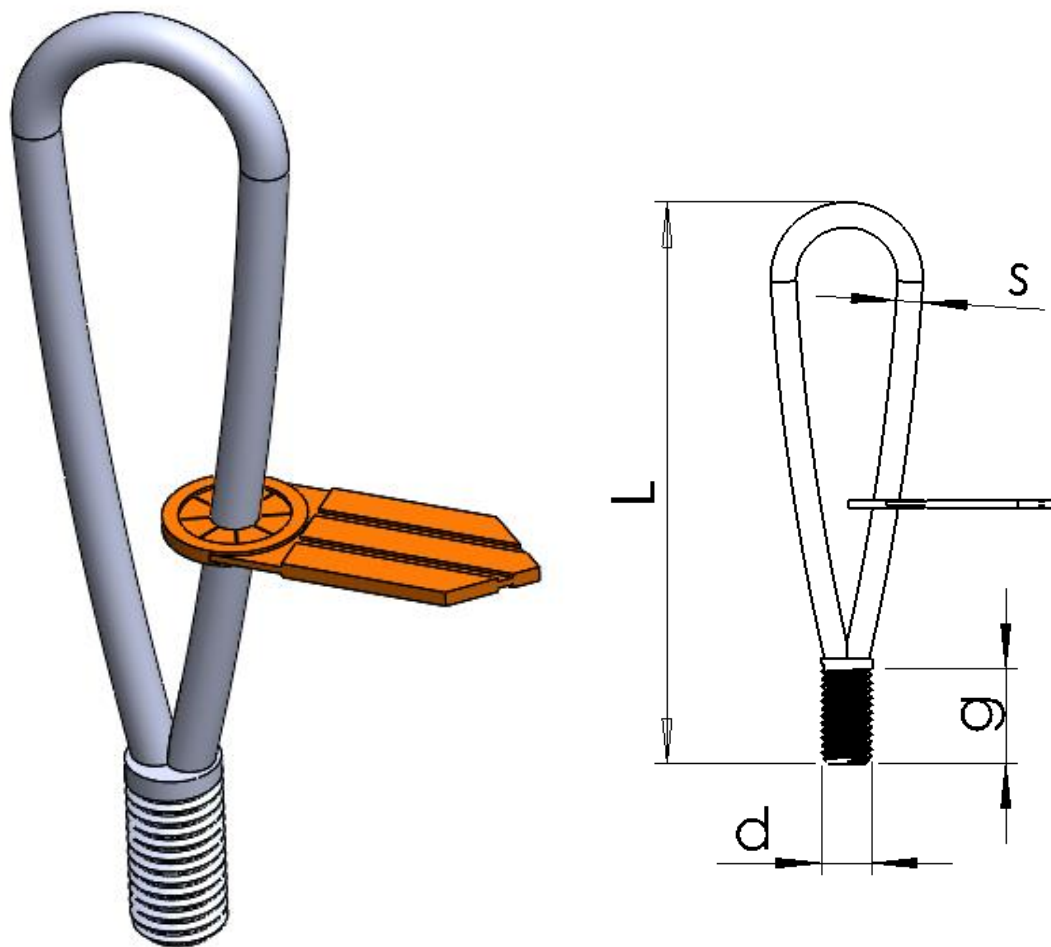


Figure 3 Universal lifter dimension sketch.

### 14.1 Technical data

Table 11 shows the dimensions of the various types of Lifting Loop

Load group lifting loop	Length of lifting loop $L$ mm	Diameter of wire $s$ mm	Thread $d$ mm	Thread length $g$ mm
0.5S	130	6	12	12,5
1.2S	170	8	16	14
2S	210	10	20	18
2.5S	260	12	24	27
4S	340	16	30	56

Table 11 Lifting loop dimension.



## 15 Product data of Alpha inclined pull lifting loop

Figure 4 shows a measurement sketch for ALPHA inclined Pull Lifting Loop

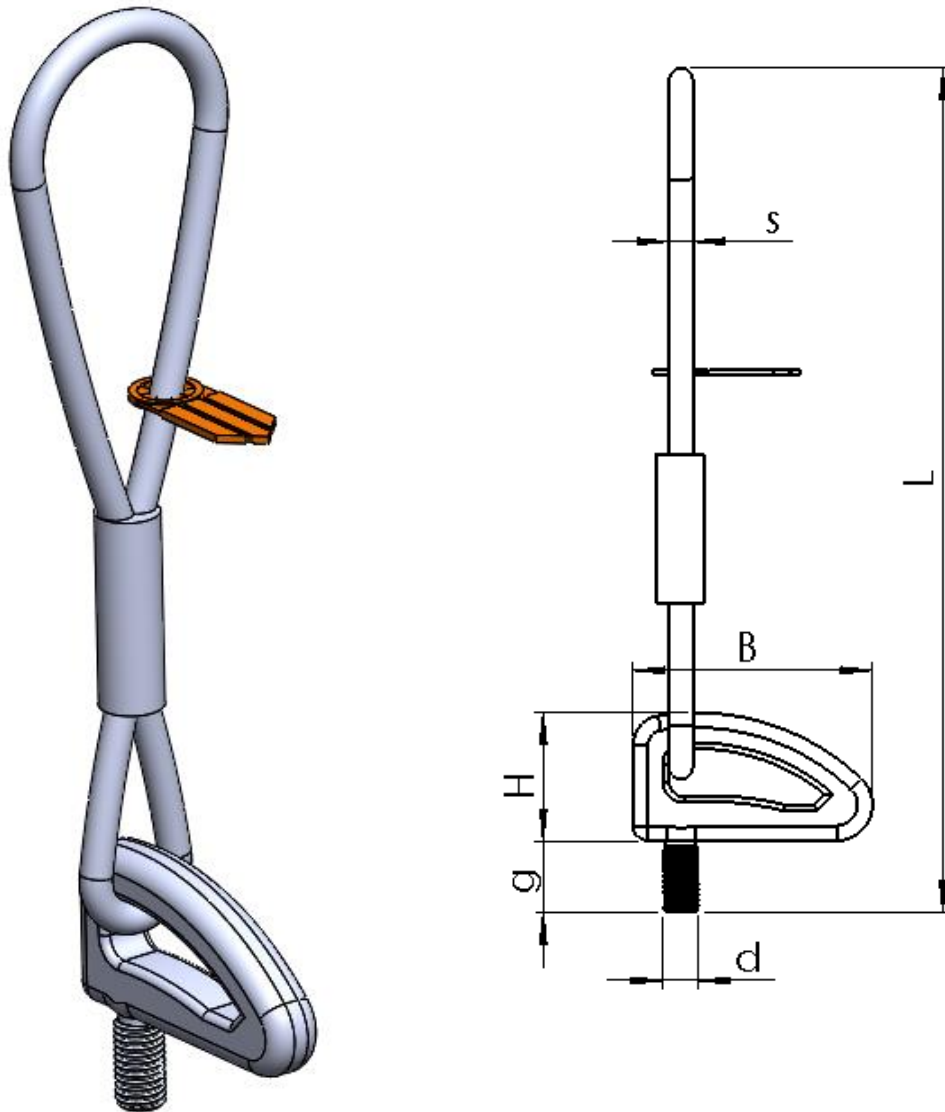


Figure 4 ALPHA inclined Pull Lifting Loop dimension sketch.

### 15.1 Technical data

Table 12 shows the dimensions of the various types of ALPHA inclined Pull Lifting Loop

Load group lifting loop	Length of lifting loop <i>L</i> mm	Diameter of wire <i>s</i> mm	Ring width <i>B</i> mm	Ring height <i>H</i> mm	Thread <i>d</i> mm	Thread length <i>g</i> mm
0.4S	260	8	55	42	10	22
0.5S	260	8	55	42	12	24
1.2S	320	10	55	42	16	28
2S	380	12	89	69	20	34
2.5S	430	14	89	69	24	39
4S	490	16	89	69	30	46

Table 12 ALPHA inclined Pull Lifting Loop dimension.

## 16 Product data of Goliath Lifting Loop with thread

Figure 5 shows a measurement sketch for Goliath Lifting Loop with thread

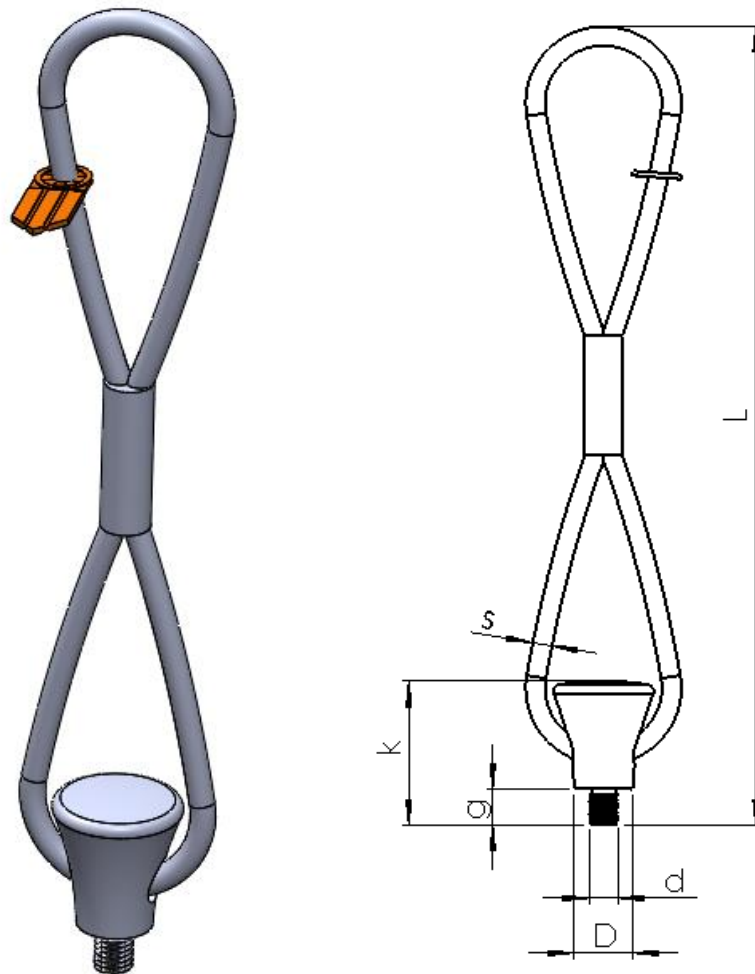


Figure 5 Goliath Lifting Loop with thread sketch.

### 16.1 Technical data

Table 13 shows the dimensions of the various types of Goliath Lifting Loop with thread.

Load group lifting loop	Length of lifting loop <i>L</i> mm	Diameter of wire <i>s</i> mm	Diameter of ring <i>D</i> mm	Ring height <i>k</i> mm	Thread <i>d</i> mm	Thread length <i>g</i> mm
0.4S	335	8	24	60	10	15
0.5S	335	8	24	60	12	15
1.2S	365	9	24	60	16	20
2S	470	12	44	102	20	25
2.5S	550	14	44	102	24	30
4S	590	16	44	102	30	35

Table 13 Goliath Lifting Loop with thread dimension.

## 17 EC – Declaration of Conformity of the Machinery

This certificate meets the requirements of the Directive 2006/42/EC Annex II.

Manufacturer and responsible for compiling the technical documentation:

Company:	<b>CERTEX Danmark A/S</b>	Tel. No.:	<b>+45 74 54 14 37</b>
Address:	<b>Trekanten 6-8 6500 Vojens Denmark</b>	E-mail:	<b>info@certex.dk</b>

The undersigned hereby declares that the below specified tool comply with the current safety and health rules and legislation within the European Union. If any changes are made on the tool without approval from the manufacturer, this Declaration no longer applies.

<b>Description:</b>	<b>Lifting loop</b>
<b>Drawing No.:</b>	<b>XXXXXXXXXXXXXXXX</b>
<b>Serial No.:</b>	<b>XXXXXX</b>
<b>Lifting Capacity:</b>	<b>WLL pr unit</b>
<b>Own Weight:</b>	<b>Kg pr unit</b>

Is made in accordance with the following EC-directive;  
**2006/42/EC**

The following standards have been used:  
**EN 13155+A2 : 2009**

Date:

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For CERTEX Danmark A/S

## Our industries, products & services

At CERTEX Denmark, we are a secure and reliable total supplier and partner within lifting equipment. Below is an overview of the industries we service, our product range, and the services we offer."



"

**Based on many years of experience  
& know-how within lifting, load  
tests & engineering, CERTEX  
Denmark is your reliable partner &  
supplier of steel wire, lifting  
applications & related services."**