



sarens
group

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Sarens Climbing Tower

SCT

The SARENS CLIMBING TOWER is designed for lifting heavy loads in the construction, petrochemical and offshore industries. The system is suited to using either climbing jacks or strand jacks to provide the lifting force.

This document outlines the general specification of the system. Detailed engineering, risk assessments and method statements must be prepared for each project.



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SARENS CLIMBING TOWER (SCT)

Kenmerken
Caracteristiques

Specifications
Kennzeichen

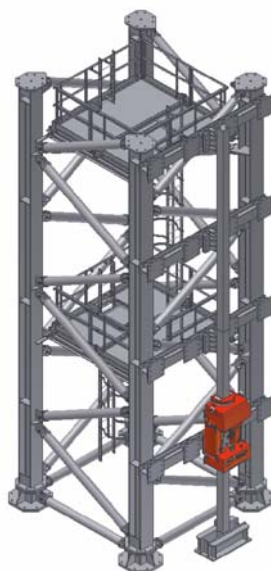
General description

The SCT system is modular comprising standard interchangeable components. The tower leg sections are either 5.7 metres or 11.4 metres long and the required tower height is achieved by combining tower sections. The tower legs are set at 3.5 metre centres and tied together on each face using tubular braces with pin connections. A stabbing guide at the end of each tower section leg provides for quick alignment and erection and standard bolts are provided to resist tensile and shear loads in the legs depending on the forces calculated for any particular lift.

Platforms and ladders are incorporated into the tower sections and link together to form a continuous safe access. Platforms are located to facilitate the bolting together of the tower legs.

The towers sit on a standard steel base frame which is mounted either on a foundation or steel structure depending on the application. A steel frame can be added to the top of the tower for mounting strand jacks, guys and/or a cross-head beam.

All tower section components are suitable for transport and storage in standard 20' and 40' containers.



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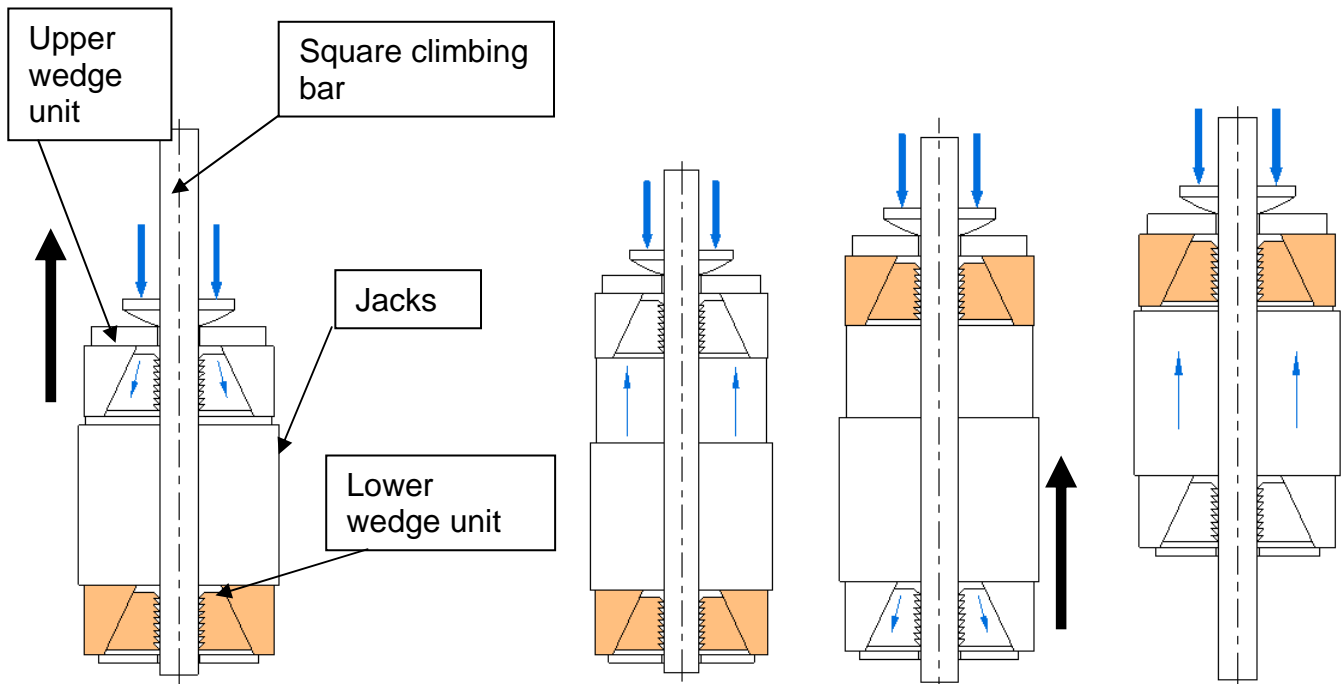
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Jacking equipment

The SCT utilises two types of jacking equipment depending upon the type of lift.

Climbing jacks

Each tower is suitable for mounting one, two, three or four 200mm climbing bars on the front face. Each 200mm climbing bar will take a 450 tonne capacity climbing jack giving a lifting capacity of up to 1800 tonnes per tower depending upon tower configuration. Each climbing jack comprises an upper wedge unit, a lower wedge unit and a pair of solid hydraulic rams which sit between the wedge units. The wedge units grip the square steel bar and work in sequence with the jacks to move along the bar as shown in simplified form below.



Stage 1
Load held in lower wedge unit Jacks extend to raise upper wedge unit

Stage 2
Load held in lower wedge unit Jacks fully extended

Stage 3
Load transferred to upper wedge unit Jacks retract to raise lower wedge unit

Stage 4
Load in upper wedge unit Jacks fully retracted Load transferred back to lower wedge unit



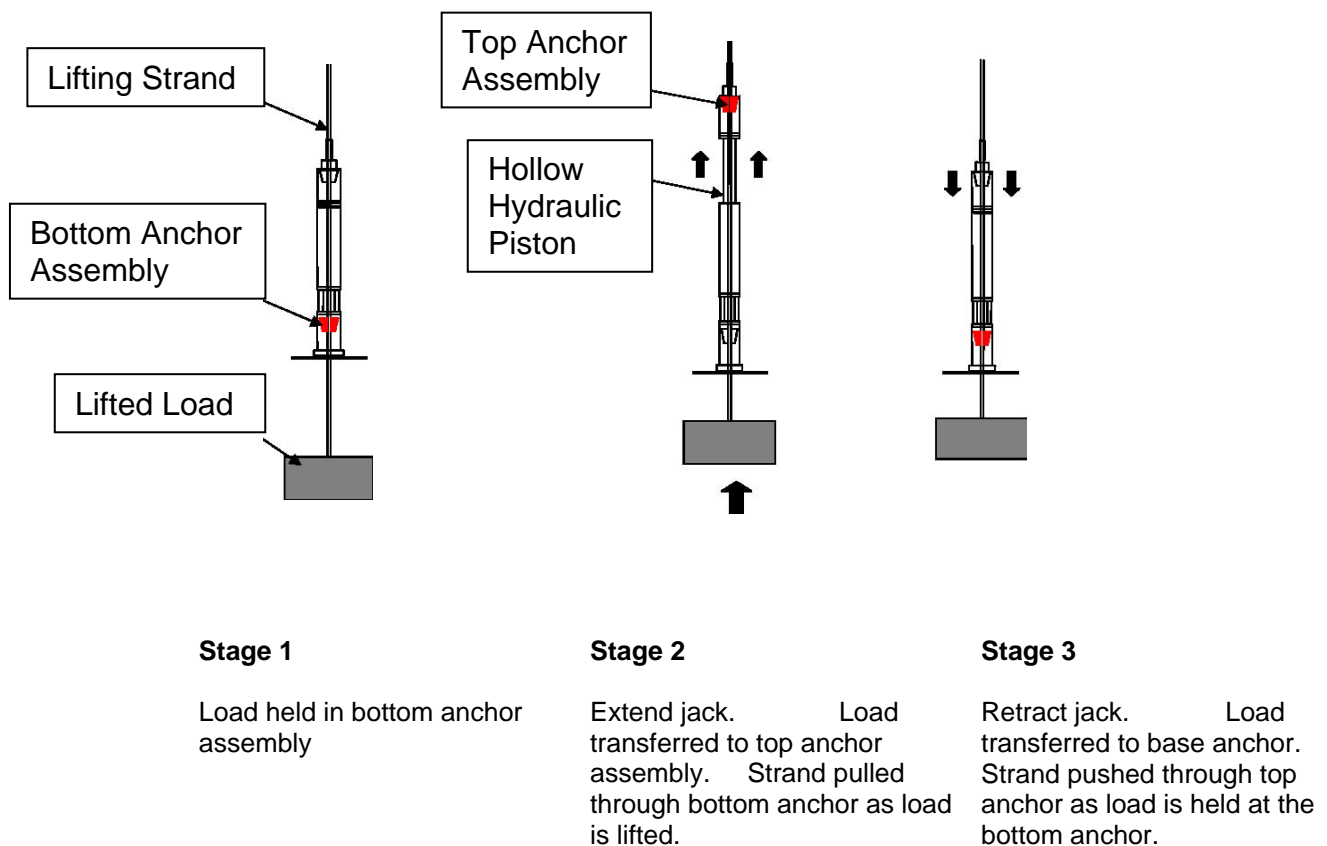
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Strandjacks

The strandjacks can be mounted on frames at the tower top or on a cross beam between tower tops. Each jack consists of a bottom anchor assembly, a main hollow hydraulic piston and a top anchor assembly. Each anchor assembly consists of a series of tapered wedges, which will automatically form a mechanical lock against the lifting strand. The operation of the hollow hydraulic piston moves the lifting strand through the jack, automatically transferring support between the top and bottom anchor assemblies. This is shown in simplified form below.



Strand jacks are available in a wide variety of capacities from 15 tonnes to 1000+ tonnes depending upon the number of strands. Each strand consists of 7 individual wires formed into a single strand approximately 18mm diameter. The minimum-breaking load of each strand is 38 tonnes and a 2.5 factor of safety is applied to this giving a working capacity of 15te per strand.

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Tower system foundation

The tower system is provided with a standard base frame. There are several options for mounting this frame to provide a strong and stable foundation to the towers. The choice of tower foundation will depend on the constraints of each site. The two primary options are as follows.

Concrete foundation

The base frame is located on a concrete foundation. The foundation may be a specially constructed and temporary or an extension or modification of existing permanent foundations.



Base mounted on concrete foundation.





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System capacity

The SCT is designed to work generally as a 2 tower free-standing system, but its modular nature means that it can be configured in an almost unlimited number of different combinations. The maximum Load that can be lifted is limited by a number of factors as follows:

- The weight of any additional temporary works and equipment reduces the net lifting capacity.
- The lifting capacity of the climbing jacks on each tower. 4 No DL-C450 climbing jacks can be used on each tower, giving a maximum lifting capacity of 1800 tonnes per tower.
- The height of lift. For a free standing tower, the maximum tower moments and shears are experienced at the base of the tower and these increase with the lift height. The tower system's lifting capacity therefore reduces as the height of lift increases.
- The in-service wind speed. The tower system capacities here are given for a gust wind speed of up to 20 m/s at the highest point on the tower. The lifting capacity may be reduced for higher in-service wind speeds or increased for lower in-service wind speeds, depending on the region and season in which the tower system is operating.





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The following safe working load chart is provided for guidance only. For precise capacity the lift needs to be fully engineered for each project with consideration of all factors.

The table is based on gross lifting capacities including weight of load plus strand, lifting beam etc. Configuration is two towers at 20 metre spacing with the vessel central to towers.

Maximum lifting wind speed is taken as 20m/s and maximum storm wind 40m/s. Guys are assumed as 4 x 185 tonne capacity.

No. 11.4m tower sections	Tower Height (m)	Strand Jacks		Climbing Jacks	
		SWL Guyed (tonnes)	SWL Unguyed (tonnes)	SWL Guyed (tonnes)	SWL Unguyed (tonnes)
2	25.6	3000	2800	3600	3600
3	37.0	2950	2275	3600	3300
4	48.4	2900	1750	3600	2400
5	59.8	2875	1300	3600	1750
6	71.2	2850	950	3600	1325
7	82.6	2800	*675	3600	1025
8	94.0	2775	*450	3600	825
9	105.4	2750	*275	3600	*650
10	116.8	2550		3600	*500
11	128.2	2300		3600	*375
12	139.6	2075		3600	
13	151.0	1800		3600	
14	162.4	1550		3250	
15	173.8	1300		2900	

*Reduced storm wind capacity

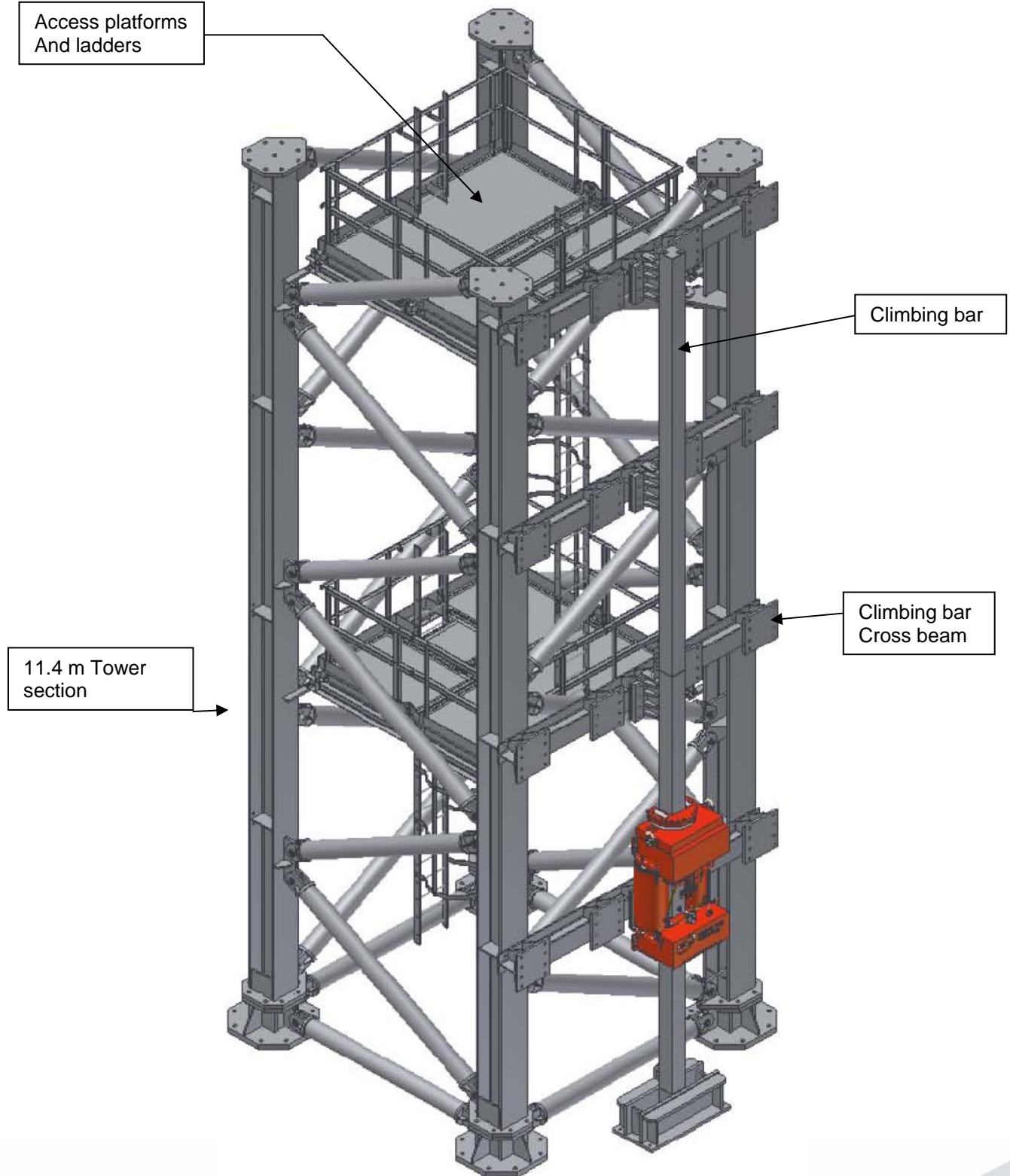


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SCT assembly



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