

Instruction- and Maintenance Manual

Self-Locking Cube Jack System

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SCJ-50 : 50 tons per unit

SCJ-100 : 100 tons per unit

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Preface

Dear customer,

This is the manual for assembling, operating and maintaining the Self-Locking Cube Jack Systems SCJ-50 and SCJ-100. In the rest of this manual, this machine is referred to by the term “**System**”.

The manual is part of the handbook of the System and is meant to be used by operators and by maintenance engineers.



NB: It is essential that the user reads this manual completely **before** start working with the System.



- All information, illustrations and technical data in this manual are applicable to the System as it was at the **time of issuing** of this manual.
- We continuously **improve** our products and therefore reserve the right to implement improvements and **changes** whenever it is necessary and possible to do so, without any obligation to apply improvements or changes to models purchased previously. Nevertheless, when the system is improved due to serious **safety issues**, you as a customer will be informed.
- If this manual becomes **unreadable**, in whole or in part, you can order a copy by providing us the number given on the front cover.
- Despite the fact that this manual has been drafted with great care, we **cannot guarantee** that it does not contain any errors.
- The use and interpretation of all information in this manual and the possible consequences through improper use of the system are wholly the **responsibility of the user**. Enerpac shall under no circumstances accept any responsibility for such improper use.

Pictures and illustrations in this manual may differ from reality.

Within this document use is made of **structured text**. The following conventions are applied:

- Procedural steps are numbered. Execute the steps sequentially. Do not skip any step.
- Responses of the system are written on the next line in italic font.
- Choices are indicated with bullets.

Example:

1	Press the green button. <i>The motor starts.</i>	
2	Select one of the options: <ul style="list-style-type: none"> • Use the red button to stop the motor • Use the blue button to pause 	

We are interested in improving our documentation, and we welcome your comments and suggestions. If you have any difficulties using this manual, discover an error, or just want to provide some feedback, contact us. Please include the handbook code as shown at the front page.

We hope this manual will help you to use the System properly.

Enerpac

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1 Introduction

1.1 Manufacturer address

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Fax. +31 74 243 03 38
Email: info.hengelo@enerpac.com
Website: www.enerpac.com

1.2 Declaration

Declaration of Conformity according to Machine Directive 2006/42/EC.
For the EC Declaration of Conformity reference is made to ref [5] "EC Declaration of " which is part of the product delivery.



1.3 Referenced documents

The following documents are referred to in this manual:

Ref	Name	Identification	Manufacturer
1.	Operation of electrical installations - Low voltage	N 3140	NEN
2.	Operation of electrical installations	NEN-EN 50110-1	NEN
3.	General rules and safety requirements for systems and their components	NEN-EN-ISO 4413	NEN
4.	Technical handbook		Enerpac
5.	EC Declaration of incorporation <i>(In case only Cube jack units are purchased without hydraulic power units)</i>		Enerpac
6.	EC Declaration of conformity <i>(In case Cube jack units are purchased including hydraulic power units)</i>	See Appendix Z. "Compatibility matrix"	Enerpac
7.	ASME B30.1-2015	Jacks, Industrial Rollers, Air Casters, and Hydraulic Gentries. (Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings)	American Society of Mechanical Engineers

1.4 Identification

Each main component is fitted with a name plate.

ENERPAC  	
Type	<input type="text"/>
Drawing	<input type="text"/> Rev. <input type="text"/>
Order nr.	<input type="text"/>
Machinery part	<input type="text"/> of <input type="text"/>
Description	<input type="text"/>
Year of manufacture	<input type="text"/>
Self weight	<input type="text"/>
<p>Enerpac Heavy Lifting Technology B.V. Zuidelijke Havenweg 3 7554RR Hengelo - The Netherlands Tel. +31(0)74 24 22 045 Service tel. +31(0)74 85 04 777</p>	



NB: Name plates are official documents. It is not permitted to alter them or render them illegible.

1.5 Liability

- Personnel as well as other people involved in the usage of the System are expected to have read and **understood** this manual.
- In cases of **doubt** about the use or application of this machine, always contact Enerpac for advice and recommendations.
- **Unauthorised alterations** to the machine may have a deleterious effect on the characteristics of the machine and may disrupt the control functions. Unauthorised alterations therefore annul any resultant damage claims against Enerpac.
- The **risk analysis** conducted by Enerpac, intended usage and reasonably foreseeable incorrect usage of the System were assessed. The instructions in this manual were drawn up based on this analysis.

1.6 Intended use

The definition of 'intended use' excludes any and all uses which do not meet the descriptions, including use that exceeds the machine's technical limitations. Enerpac shall not accept any liability for damage resulting from use that is not in accordance with the machine's intended use. The user shall bear any and all risks. The definition of 'intended use' also includes strict compliance with the instructions in the user manual and assumes that the equipment is inspected and maintained at the indicated times.

- The System should only be used in the **intended manner** as described in the instructions in this manual.
- The System should only be operated by **operators** with full knowledge of the applicable safety regulations and the hazards which may arise during use.
- The System was developed and built according to the officially recognized safety **regulations**. However, if the machine is not used as intended:
 - This may pose a **risk** to the health and lives of operators and bystanders.
 - The System may not function properly or may create **hazardous** situations.
- The System should only be used if the machine is in perfect technical **condition**.
- Faults which may result in hazardous situations must be **resolved** immediately.
- The machine must not be used in potentially **explosive** environments.

The intended use of the System is to lift a heavy load in vertical direction.

1.7 Modifications

Never make any **modifications** or additions which could have an adverse impact on safety without prior approval from Enerpac. This also applies to the installation and adjustment of safety devices and valves and welding work on the System.

Spare parts should meet the technical specifications given by Enerpac.

Preferably apply **original spare parts** as these parts are made according to the technical specifications of Enerpac.

In cases of doubt, please contact Enerpac.

1.8 Personnel and responsibilities

- Only **qualified personnel** are allowed to **operate** the System.
Qualified personnel are those who have certified skills to operate the System.
They should preferably have received training from Enerpac, or else from the customer.
- Only **qualified personnel** are allowed to **maintain** the System.
Qualified personnel are those who have certified main education for the jobs they have to perform, either mechanical, hydraulically or electrical.
They should preferably have received training from Enerpac, or else from the customer.
- **Qualification** of the personnel is a responsibility of the customer.
- Always comply with legal **minimum age** stipulations.
- The System should only be used, maintained and repaired by properly **instructed** and **trained** personnel. Clearly describe the qualifications of the relevant employees with regard to use, commissioning, assembly, disassembly and all maintenance and repair work. If work must be performed by third parties, they must receive clear instructions so both the client and the contractor are up-to-date on the agreements reached.
- The supervisor and operator are authorized to refrain from following any instructions from **third parties** that may pose a risk to the machines or bystanders.
- Personnel who have **not been fully trained** and instructed in the use of the machine, or personnel who have only received general training, may only perform work on the System under continuous **supervision** of a qualified person.
- Work on the **electrical** and the **hydraulic systems** must be performed by competent, qualified personnel, or by trained personnel under the direct supervision of qualified personnel, in compliance with all applicable rules and regulations.
- **Assembly and disassembly** may only be performed by trained installers under the supervision of an authorized person who has adequate knowledge of the System.

The responsibilities listed in the following sub-sections are in accordance with the standard as referred to in Ref [7] ASME B30.1-2015.

In some situations, the owner and the user may be the same entity and is therefore accountable for all of the following responsibilities listed in this chapter.

In other cases, the user may lease or rent the system without supervisory, operational, maintenance, support personnel, or services from the system owner. In these situations, sections 1.8.1 "The owner of the system" and 1.8.2 "The user of the system" shall apply.

1.8.1 The owner of the system

The responsibilities of the owner of the system are:

- a) to make sure the system meets the requirements as given in this manual as well as specific job requirements defined by the user,
- b) to make sure the system and all necessary components, specified by the manufacturer, meet the user's requested configuration and capacity,
- c) to provide the applicable capacity charts to the user,
- d) to provide this manual to the user to enable correct assembly, disassembly, operation and maintenance information,
- e) to make sure all inspections and maintenance activities are performed,
- f) to designate personnel for maintenance, repair, transport, assembly, and disassembly,

- g) and to designate personnel for inspections as required in the applicable chapters.

1.8.2 The user of the system

The responsibilities of the user of the system are:

- a) to comply with the requirements of this manual and all regulations applicable at the work site,
- b) to use supervisors for activities,
- c) to ensure that the system is in proper operating condition, prior to initial use at the worksite by
 - verifying that the Owner has provided this manual,
 - and verifying that a frequent inspection has been performed,
- d) to verify that the system has the necessary capacity to perform the proposed operations in the planned configuration,
- e) to ensure the assigned operators have been notified of adjustments or repairs that have not yet been completed, prior to commencing operations,
- f) to designate personnel for inspections as required in the applicable chapter,
- g) to designate personnel for maintenance, repair, transport, assembly, and disassembly,
- h) to ensure that all personnel involved in maintenance, repair, transport, assembly, disassembly, and inspection are aware of their responsibilities, assigned duties, and the associated hazards,
- i) and to ensure that the inspection, testing, and maintenance programs specified by owner are followed.

1.8.3 The site supervisor

In some cases, the site supervisor and the system director may be the same person.

The responsibilities of the site supervisor shall include the following:

1. ensuring that the system meets the requirements prior to initial site usage.
2. determining if additional regulations or requirements are applicable.
3. ensuring that a qualified person is designated as the system director.
4. ensuring that the operations are coordinated with other jobsite activities that will be affected by or will affect the operations.
5. ensuring that the area for the system is adequately prepared. The preparation includes, but is not limited to, the following:
 - a. access for the system and associated equipment.
 - b. sufficient room to assemble and disassemble the system.
 - c. an operating area that is suitable for the system with respect to levelness, surface conditions, support capability, proximity to power lines, excavations, slopes, underground utilities, subsurface construction, and obstructions to operation.
 - d. traffic control as necessary to restrict unauthorized access to the system's working area.
 - e. ensuring that work involving the assembly and disassembly of system is supervised by a qualified person.
 - f. ensuring that operators meet the physical, knowledge, and skill requirements as described in this manual.
 - g. ensuring that conditions that may adversely affect the operations are addressed. Such conditions include, but are not limited to, the following:
 - poor soil or support conditions
 - wind velocity or gusting wind
 - weather conditions
 - extreme temperatures
 - inadequate lighting
 - operating surface conditions
 - excessive noise proximity to energized sources (e.g., power lines, pressurized lines)
 - ensuring that work performed by the rigging crew is supervised by a qualified person
 - ensuring that maintenance is performed by a designated person

1.8.4 The system director

The system Director's responsibilities shall include the following:

- a. being present at the job site during the operations.
- b. stopping the operations if alerted to an unsafe condition.

- c. ensuring that the preparation of the area needed to support the operation has been completed before the operation starts.
- d. ensuring necessary traffic controls are in place to restrict unauthorized access to the system's work area.
- e. ensuring that personnel involved in the operations understand their responsibilities, assigned duties, and the associated hazards.
- f. addressing safety concerns raised by the system operator or other personnel and being responsible if he decides to overrule those concerns and directs the operation to continue. In all cases the manufacturer's criteria for safe operation and the requirements of this manual shall be followed.
- g. designating the signal person(s) and conveying that information to the system operator.
- h. evaluating the operation in proximity to energized sources.
- i. ensuring precautions are implemented when hazards associated with special load handling operations are present. Such operations may include, but are not limited to, the following:
 - multiple types of system used simultaneously
 - shifting centre(s) of gravity or lifting below the centre of gravity
 - shifting, inclined, or moving surfaces
 - operating barges
 - informing the system operator of the weight and planned movement of the loads to be handled.
 - obtaining the system operator's verification that this weight does not exceed the system's rated load.
 - ensuring that load rigging personnel have been designated for the system.
 - ensuring that the load is properly rigged and stable.

1.8.5 The operators

The system Operator shall be responsible for the following listed items.

The system Operator shall not be responsible for hazards or conditions that are not under his direct control and that adversely affect the system operations.

Whenever the system Operator has doubt as to the safety of operation, the system Operator shall stop the system functions in a controlled manner. System operations shall resume only after safety concerns have been addressed and the continuation of the operation is directed by the system Director.

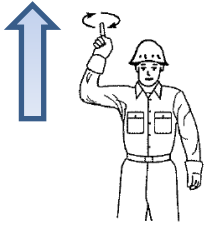
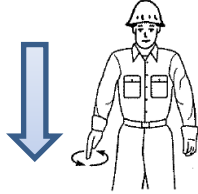
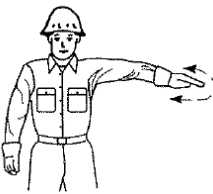
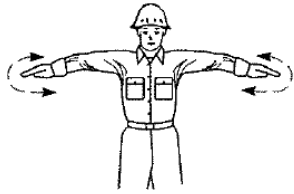


The system Operator's responsibilities shall include the following:

- a. reviewing the requirements for the system with the Director before the operations.
- b. knowing what types of site conditions could adversely affect the operation of the system and consulting with the system Director concerning the possible presence of those conditions.
- c. understanding and applying the information contained in this manual.
- d. understanding the system's functions and limitations as well as its particular operating characteristics.
- e. using the system's load/capacity chart(s) and diagrams and applying all notes and warnings related to the charts to confirm the correct system configuration to suit the load, site, and load handling conditions.
- f. refusing to operate the system when any portion of the load or the system could be adversely affected by proximity to energized sources until evaluated and approved by a qualified person.
- g. performing inspections as specified in the applicable chapter.
- h. promptly reporting the need for any adjustments or repairs.
- i. following applicable lock out/tag out procedures,
- j. not operating the system when physically or mentally unfit.
- k. ensuring that all controls are in the off or neutral position and that all personnel are in the clear before energizing the system.
- l. not engaging in any practice that will divert his attention while actually operating the system controls.
- m. testing the system function controls that will be used and operating the system only if those function controls respond properly.
- n. operating the system's functions, under normal operating conditions, in a smooth and controlled manner.
- o. knowing and following the procedures specified by the system manufacturer or approved by a qualified person for assembly, disassembly, and setting up the system.
- p. knowing how to travel the system, if applicable.
- q. ensuring that the load and rigging weight(s) have been provided.

- r. calculating or determining the rated load for all configurations that will be used and verifying, using the capacity chart(s), that the system has sufficient capacity for the proposed operation.
- s. considering all factors known that might affect the system capacity and informing the system Director of the need to make appropriate adjustments.
- t. knowing the standard and special signals as specified in the applicable chapter and responding to such signals from the signalperson. When a signalperson is not required, the system Operator is then responsible for the movement of the system. However, the system Operator shall obey a stop signal at all times, no matter who gives it.
- u. Understanding of rigging and basic rigging procedures. Ensuring that the load is properly secured and will be lifted safely.
- v. if power fails during the operations
 - set all locking devices
 - move all power controls to the OFF or neutral position
 - secure and stabilize the load, if practical
- w. before leaving the system unattended
 - secure and stabilize the load
 - set all locking devices
 - put the system controls in the OFF or neutral position
 - turn off the system power source
 - follow the recommendations as given in this manual or given by a qualified person for securing the system

1.9 Hand signals

The following hand signals are applicable when using the system:

<p>RAISE.</p> <p>With forearm vertical, forefinger pointing up, move hand in small horizontal circle.</p>		<p>LOWER.</p> <p>With arm extended downward, forefinger pointing down, move hand in small horizontal circle.</p>	
<p>STOP.</p> <p>Arm extended, palm down, move arm back and forth horizontally.</p>		<p>EMERGENCY STOP.</p> <p>Both arms extended, palms down, move arms back and forth horizontally.</p>	
<p>END EVERYTHING.</p> <p>Clasp hands in front of body.</p>		<p>INDIVIDUAL UNITS.</p> <p>Hold up: one finger for leg marked: "1," two fingers for leg marked "2". Regular signals follow.</p>	

1.10 Lifetime

No lifetime of the System is specified, since its safe and effective lifetime strongly depends on

- the intensity of use,
- the quality of the maintenance,
- the service conditions the system is exposed to, like wet or salty environments,
- and the load to which the system is exposed.

1.11 Warning symbols used within this document

In this manual warnings and symbols are used to draw your attention to important safety information. The table below shows the applied warnings and symbols:



NB is used to highlight important **work activities** and for **additional information**



Caution is used if failure to heed the given instructions may result in **damage to the system**



Attention is a general warning to the operator of potential damage to **equipment** and the **environment**



Hazard draws the user's attention to potential **hazards to personnel** if work instructions are not followed precisely

2 General safety aspects

This chapter contains general safety aspects.
Specific safety directions are mentioned in other chapters.

2.1 Mandatory protective gear

While using the System ensure that the locally applicable safety regulations are observed

Make sure that all people on the working place observe the following safety regulations:



Always wear • safety goggles and a safety helmet



Always wear • safety footwear



Wear safety gloves.
But we strongly advise not to wear them when operating handheld control consoles



Wear a safety harness when working at heights more than 2 meters

2.2 General safety regulations

Special safety regulations are given in the relevant national legislations or company regulations for accident prevention. Compliance with these rules and regulations is a legal requirement and a condition of employment. In addition to the safety regulations set out under the law, also observe the following points:

- Keep the worksite **clean**.
- Before every start-up, always check that there are no **persons** in an unsafe situation or position with respect to the System. Stop working if, despite warnings, there are still employees in an unsafe situation.
- Only use the System on an adequately stable and robust **subsurface**.
- Keep all equipment out of the area of above-ground **power lines**.
- The **coverings** must be closed (this does not apply to the covering on control panels).
- The operator must switch off the System before leaving it **unattended**.
- Use all required **Personal Protection Equipment (PPE)**.
- Do not wear any loose **clothing or jewellery**. Long hair must be tied back.
- **Tools** and equipment, necessary for (dis-)assembly of the System as well as for maintenance have to be in good condition. Badly maintained equipment can cause time wastage and lead to permanent damage to the equipment and/or its surroundings
- Keep the hydraulic and moving equipment of the System **clean** to prevent it from jamming or causing damage to itself or other equipment.
- Do not use the System, whether loaded or not, while unauthorized people are in its **vicinity**. The System can be operated remotely.
- Maintain **focus** during the work. Carelessness may result in serious injuries.
- Additional **lifting gear** and accessories such as hawsers, shackles, lugs, slings etc. must comply with the legal requirements imposed in the country of use.
- **Inspect** the condition of the System before *every* individual start-up, given the fact that the slightest defect may have severe consequences.
- Personnel shall not place any **part of their body** under the load.
- Personnel shall **remain clear** of the system during operation.
- Personnel shall **not ride** on the system while it is moving or being moved.

- Remove loose tools or components from the load or the System if the load will be moved as they might fall down during moving, which can lead to fatal accidents.

Enerpac is not liable for improper use of accessories in combination with the System.

2.3 Symbols applied to the System

The System can be labelled with

- warning symbols,
- and mandatory signs.

The table below shows the most commonly used **warning symbols** in industrial environments:



Danger of contact with moving machine parts



Danger of lethal voltage in the control panels



Danger of **parts of hands** getting trapped/caught



Danger of **parts of feet** getting trapped/caught



Danger of **falling**



Danger, exercise extreme attention and caution when **under moving loads**.



Danger of getting **trapped**/caught between moving parts.

The table below shows the most common symbols of **mandatory signs** in industrial environments:



Read the instruction manual.



Wear **gloves** to prevent injury from and/or exposure to chemicals.



Wear safety **glasses** to prevent eye injuries.



Wear safety **shoes** to prevent injuries caused by falling objects and/or feet getting caught in machinery.



Wear **hearing** protection.



Wear a safety **helmet** to prevent injuries caused by falling objects.



Wear a safety **harness**

**NB:**

- The stickers on the machine are official documents and it is not permitted to alter them or render them illegible
- It is strictly obligatory to observe the warning symbols and the mandatory signs applied to the machine.

2.4 Welding work

- Welding, cutting and grinding work on the System is only permitted with the **prior written consent** of Enerpac.
- Welders must be properly qualified and must have a valid welding certificate.
- If welding work needs to be performed on the System then
- Switch the machine off
- Disconnect all power cables and communications cables
- Connect the system to a direct earth line.



NB: welding, cutting, grinding or any other structural adjustment work on the System is not permitted without Enerpac's prior written permission

2.5 Working on the electrical system

- In the event of an electrical fault in the electric control system, you must bring all connected devices into a safe condition. **Switch off** the System.
- Work on the electrical system must be performed by a competent, **qualified electrician** or by trained personnel under the direct supervision of a qualified electrician, in compliance with all applicable rules and regulations such as
 - Ref 1 "Operation of electrical installations - Low voltage"
 - Ref 2 "Operation of electrical installations".
- **Switch the power off** before inspection, maintenance or repair of the System. Make sure that there is no power on the relevant parts. If necessary, connect the machine to earth. Insulate any adjacent component that is still under voltage.
- Check and inspect the electrical system of the System at **regular intervals**. Problems, such as loose connections and damaged or stuck wiring, must be resolved immediately. Only use original fuses and circuit breakers with the correct current value.
- If work does need to be performed on components which are under **voltage**, then cordon off the work zone and only use certified and properly insulated tools.

2.6 Working on the hydraulic system

- Work on the hydraulics system or other components in a pressurized system must be performed by a **competent, qualified installer** or by trained personnel under the direct supervision of a qualified installer, in compliance with all applicable rules and regulations.
- Check all pipes, hoses, quick-release couplings and screw joints **regularly** for leaks and visible external damage. Repair damage immediately. Pressurized hydraulic fluid leaks may cause serious injury, and it may cause fire and damage to the environment.
- If parts need to be removed from the hydraulic system, the **hydraulic pressure must be released** according to the instructions in this manual before beginning work.

- Expand and install pressurized hydraulic pipes, tubes and lines in accordance with professional standards.
- Make sure that no ports have been **switched** during re-installation work.
- All parts and the length and quality of hoses meet the requirements of Ref 3 “General rules and safety requirements for systems and their components”.

2.7 Fire

The course of action in the event of an emergency is determined by the rules and regulations applicable on the worksite. Every company has its own special rules. So make sure you are up-to-date on these rules.

In any case, the following actions are necessary in the event of a fire:

- Keep **calm**.
- **Report** the emergency to the employee responsible for in-house emergency services (IHES).
Tell who you are, where you are located and describe the emergency situation.
(The IHES employee will notify external emergency services.)
- **Warn** your colleagues.
- **Extinguish** the fire if it is still in its early stage, using the extinguishing means available onsite.
- If possible, **switch off** the electrical power supply.
- Leave **the scene** of the emergency situation and report to the rendez-vous point.



Caution: Never use water to put out an electrical fire or a fluid fire

2.8 Working with hazardous substances

It is thought that special first aid procedures are required in cases of accidents with chemicals. But in cases of small quantities, standard measures suffice:

1. rinse thoroughly with water
2. wash with soap
3. provide fresh air
4. remove any contaminated clothing

In common the following rules are applicable:

- Contact with **skin**:
 - rinse thoroughly with water
 - remove any contaminated clothing
 - wash the relevant body parts with soap.
- Contact with **eyes**:
 - rinse thoroughly with water (10 till 15 minutes) using eye wash fountain
 - consult a doctor.
- Ingestion:
 - rinse the mouth out with water.
 - If necessary, dilute the substance by drinking water.
 - If a corrosive substance has been ingested, do not induce vomiting. This is to prevent the substance coming into contact with the sensitive oesophagus again.
 - If the victim is unconscious, never attempt to induce vomiting or have the victim drink anything.

Using a ‘neutralizing solution’ (such as a base for an acid) can actually make the situation **worse**.

In addition to this, it is advisable to consult the safety information (TREM CARD book, safety information sheets and the catalogue) and report everything that is relevant to the accident to a doctor.

When work has to be done in confined spaces:


- Wear personal protection equipment
- ventilate according to the relevant regulations

- Ask a colleague to remain by the entrance in order to provide assistance in the event of an emergency.
- You are legally required to be **familiar with the potential hazards** of the product. The safety information sheets are intended to provide adequate, correct and up-to-date information on all substances used on the worksite.
- Relevant safety information sheets are given in E “Hydraulic fluid safety information”.

During maintenance, you may work with substances fitted with **GHS symbols**. These GHS symbols are explained in the next below.¹

Symbol	General hazard indication	Possible precautionary measures
	May cause an allergic reaction on the skin.	Contaminated work clothing must not leave the workspace.
	Harmful to aquatic organisms, with long term effects	Do not discharge into the environment.
	Causes serious eye injury and/or damage to the skin.	Wear eye protection and skin protection (such as protective gloves).
	Fire hazard when heated and/or in presence of sparks.	Keep away from heat, sparks, open flames and/or hot surfaces. No smoking!
	May cause fire (oxidising agent).	Take the necessary precautionary measures to prevent mixture with flammable substances.
	Toxic in cases of ingestion and/or skin penetration	Do not eat, drink or smoke when using this product.
	May cause hypersensitivity of the airways or heritable mutations in male reproductive cells, is a potential carcinogen and/or is toxic to human reproduction	Apply a strict hygiene/health policy and wear suitable personal protection equipment.
	Explosion hazard when heated and/or in presence of sparks	Keep away from heat, sparks, open flames and/or hot surfaces. No smoking!

¹ CLP is the Regulation on Classification, Labelling and Packaging of substances and mixtures (EC No 1272/2008). This regulation brings European legislation on the classification, labelling and packaging of chemical substances into accordance with the GHS (Global Harmonised System for classification and labelling of chemical substances). The GHS is a United Nations system used to identify chemical substances and inform users of their hazards using standard symbols and phrases on labels, packaging and Safety Information Sheets (SIS).

Symbol	General hazard indication	Possible precautionary measures
	Contains a gas under pressure. May explode if heated	Keep out of sunlight. Store in a well-ventilated space.

2.9 Assembly and disassembly

- **Assembly** and disassembly of the System has to be performed by properly trained operators
- Only use **certified lifting** and hoisting equipment.
Check the validity of these certificates and qualifications.
- Only use lifting and hoisting equipment with **suitable capacity** for the loads in question.
- Before commissioning, any parts that were disassembled for transport must be **re-assembled**, re-installed, checked and approved by qualified personnel.
- Make sure that the **instructions in this manual** have been followed precisely before commissioning the System.
- **Lift** loads as described in the user manual (connection points for lifting hooks) and observe the professional standards.



Hazard: Any components that are blocked or stuck in any way (and any parts connected to these components) will be under mechanical tension. If you release these parts, they could change position suddenly and seriously injure you

2.10 Transport, loading and unloading of the System

- Loading and unloading has to be performed by properly trained operators
- Only use lifting and hoisting equipment with suitable capacity for the loads in question.
- Lift loads as described in the user manual (connection points for lifting hooks) and observe the professional standards.
- Only use suitable containers with adequate load-bearing capacity for transport purposes.
- Secure the load properly using suitable connection points and twist locks (for the containers). When using twist locks secure them properly and check that the locking mechanism is working correctly.
- Disconnect all electrical and hydraulic connections when the System has to be moved, even if it is for only a short distance.
- To avoid damage during transport use timbers, rubber pads and plastic for packaging.
- Containers may be used for transport, since they provide rigid protection against and avoid weather influences. Make sure that all parts are secured against sliding around.


2.11 Dealing with hoses

2.11.1 Common directions

- Make sure the **maximum** permitted pressure is never exceeded:
 - Do not change any safety setting.
- Ensure that the **accumulators** and by-pass hoses are in good condition.
- Do not **drive over** or stand on the hoses:
 - Standing on and driving over the hoses causes' damage to the hose fabric, which causes leaks.
 - A sudden increase in pressure caused by squeezing the hose causes serious damage to other components.
- Do not **pull** on a hose that is connected:
 - If pulling forces are exerted on a hydraulic coupling the hose and coupling interface will weaken which may result in the hose bursting out of the coupling.
 - Always lift a hose by the hose itself, whilst supporting the coupling.

- Stow hoses in such a way that no forces (gravitational force) are exerted on the coupling.
- While moving the hoses, prevent the couplings **being dragged** over the ground:
 - Prevent excessive wear on the couplings and hoses by transporting them on pallets, if possible.
 - During assembly the hose must be supported by necessary use bend guides to prevent twisting of the hose.
- Protect the hose **sleeve** in places where chafing etc. cannot be avoided:
 - Wear spots can be prevented by sliding protective sleeves over areas where wear is expected or by covering sharp edges.
- Change **worn or damaged hoses** immediately:
 - If a hose is pressurized continuously by more than 20% above working pressure it must be replaced.
- Do not use **dirty** or corroded couplings.
 - They are less reliable
 - They will cause leaks over time.
 - They pollute the hydraulic system
- **Disconnecting** hydraulic tubing and hoses shall be done with utmost care.
 - The system is designed in such a way that hydraulic pressure drops to zero when the system is switched off. Nevertheless, pressure can remain due to
 - The presence of load on the system
 - Raise of temperature
 - But the hydraulic connections have been designed in such a way that either
 - they cannot be uncoupled when they're under pressure, or
 - they can be uncoupled under pressure of only a few bars, but measures have been taken that no oil can come out
 - Always use the manometers of the System to verify that the pressure is zero.

2.11.2 Main procedure for connecting hoses

1.	Inspect the couplings. Clean the coupling if dirty. Replace the coupling if damaged.	
2.	Clean the inner and outer side of the couplings before they are mounted; dirt might get in the system causing damage. Use degreaser.	
3.	Dry the couplings with paper and visually check them for dirt.	 <p>Caution: Do not use any brake cleaner or other detergents; they might affect the couplings.</p>
4.	Hoses which are not mounted may be under pressure though, due to exposure to warmth. If so, it is hard to connect the couplings. To reduce the pressure in the hose: <ol style="list-style-type: none"> 1. Twist the coupling off the hose. <i>A little until oil will come out</i> 2. Turn the coupling tight again. 	
5.	Screw the screw-coupling together to the end. <i>While tightening the couplings, the oil passage is opened up</i>	

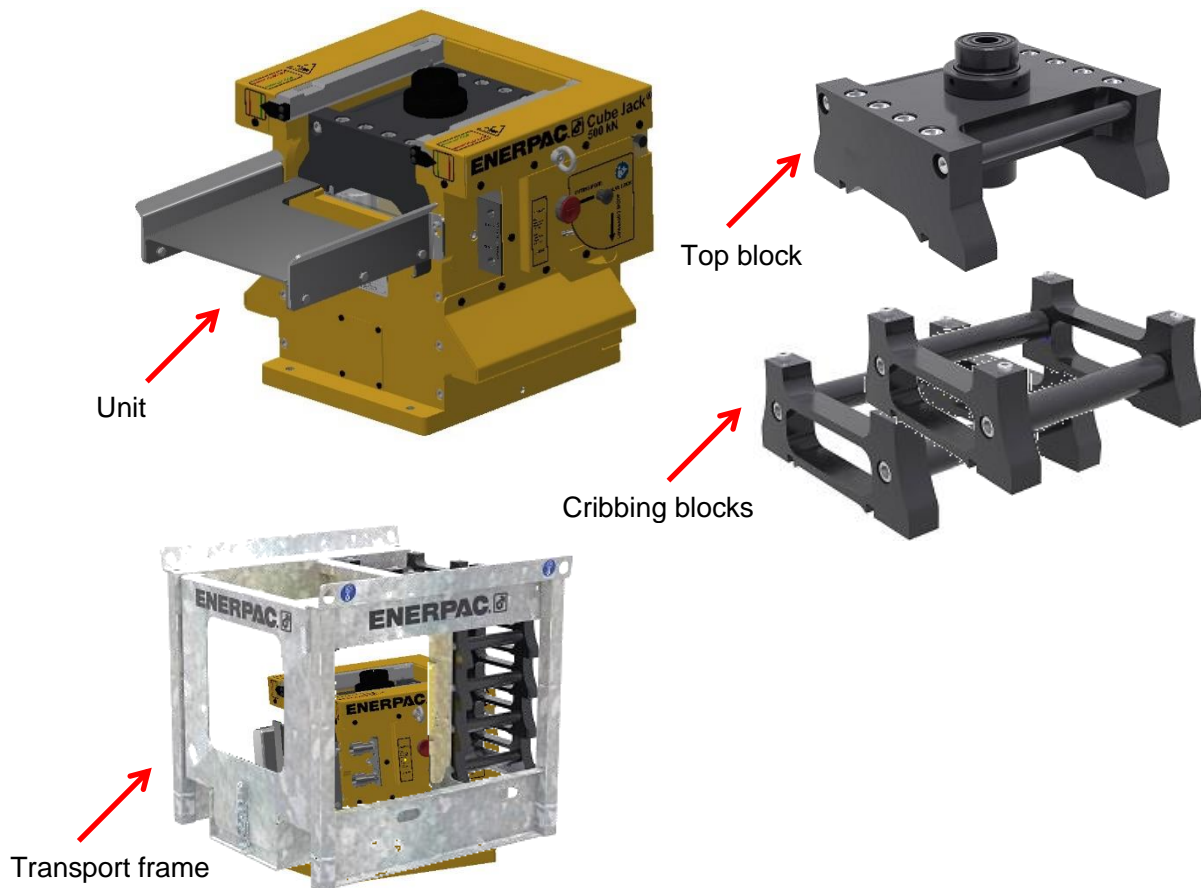


Hazard: Careless handling of hydraulics can cause serious injuries

3 System Overview

This chapter describes the main functions and components of the System. The SCJ-50 and the SCJ-100 do have a similar construction; only the dimensions differ. The pictures below show the SCJ-50.

3.1 General



The SCJ-50 is provided with 11 **cribbing blocks** and one **top block** and the SCJ100 with 18 cribbing blocks and one top block.

The top block is provided with a flexible 3-D **saddle** to ensure a good touch with the load. The height of the saddle of the top barrel can be adjusted over a few centimetres in order to assure that all top blocks are in contact with the load prior to the lift.

A **transporting frame** is provided in which a unit together with all cribbing blocks as well as the top block can be stored and transported.

The system can be powered by a synchronized EVO system as pump. When the height is critical, additionally a **stroke encoder** can be applied for more accurate height control.

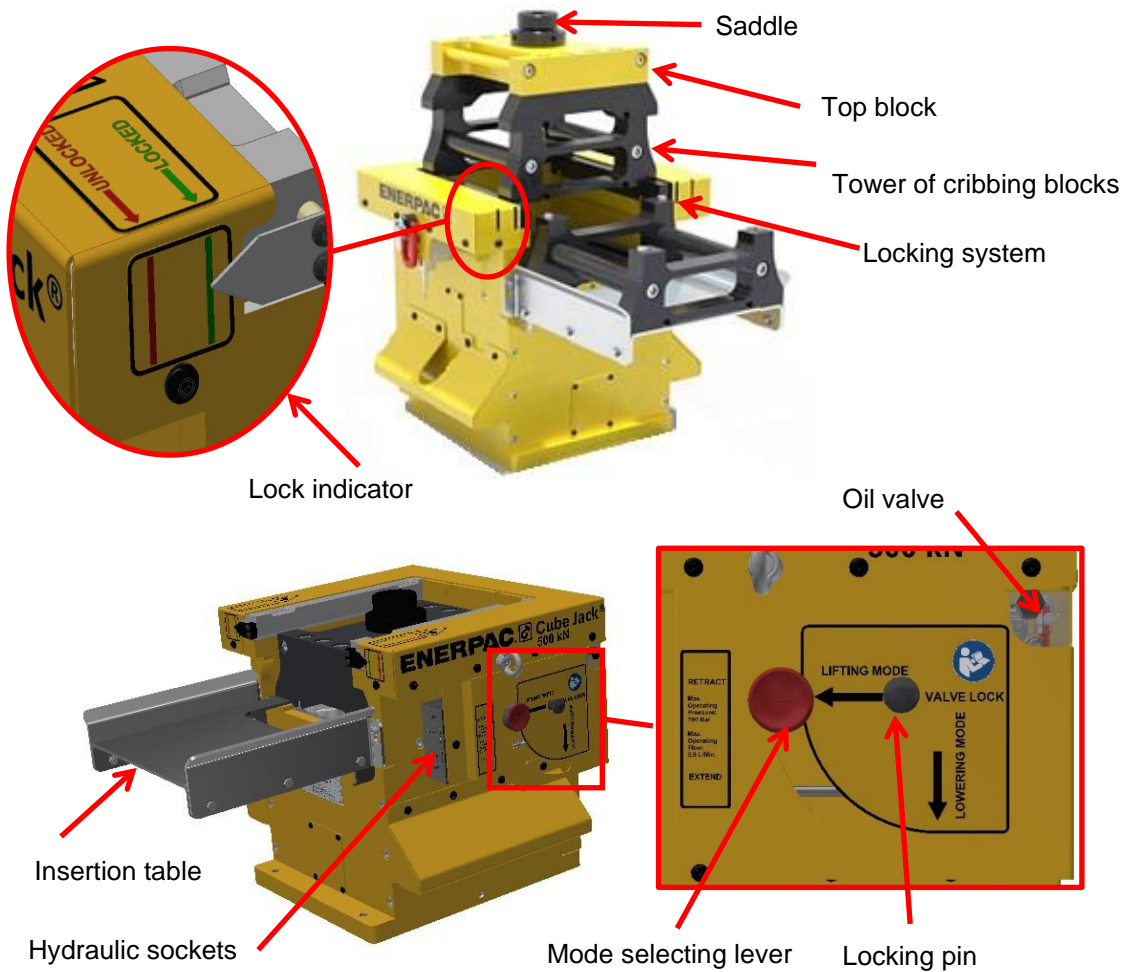
The system is intended to be used in configurations of multiple units. Details are given in section 3.5 "System configurations".

A **hydraulic power unit** is required but is not part of the delivery. Details are given in section 3.5 "System configurations".

The system does not require electric power.

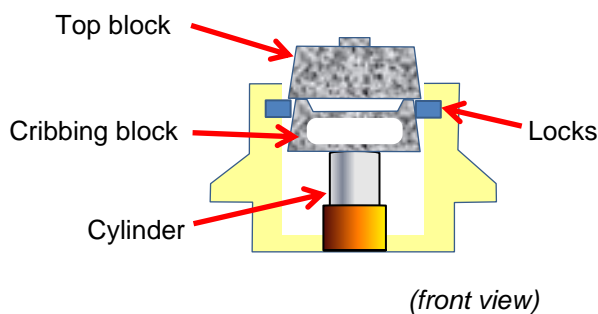
3.1.1 The Unit

The **lifting cylinder**, inside the unit, is powered by an external hydraulic power unit, which is connected to the **hydraulic sockets**. With the **mode selecting lever** the required action is selected, either lifting or lowering. During lifting, **cribbing blocks** are inserted into the unit by hand, using the **insertion table**. Up to 11 cribbing blocks for the SCJ-50 and 18 cribbing blocks for the SCJ-100 can be applied. The **locking system** enables alternately inserting cribbing blocks and lifting. The locks close by spring force and open by an automatically controlled hydraulic cylinder, depending of the phase of the lifting process. **Lock indicators** show the lock/unlock position of the locks. The **pressure relief valve** safeguards the system.



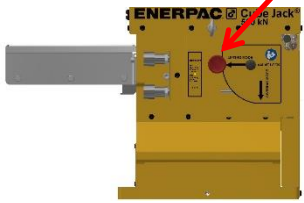
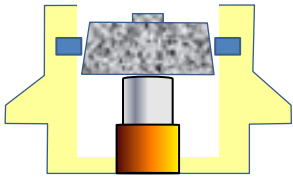
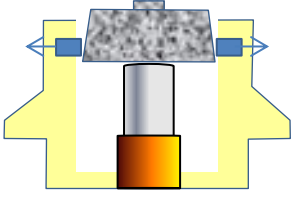
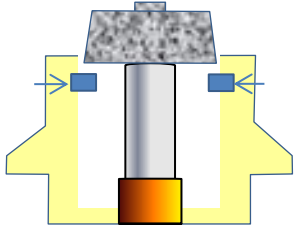
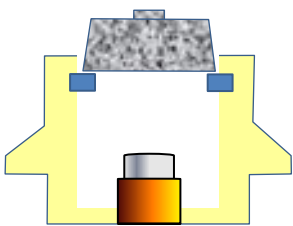
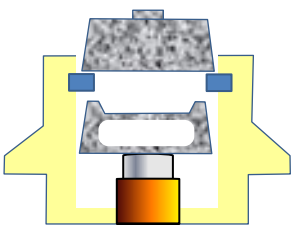
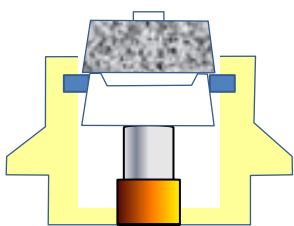
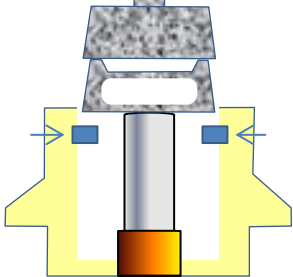
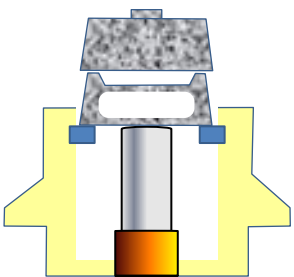
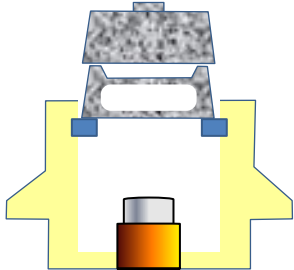

3.2 The operating principle

This section illustrates all phases of the lifting and lowering sequences. Use is made of a simplified illustration which shows only the functional parts of a unit:



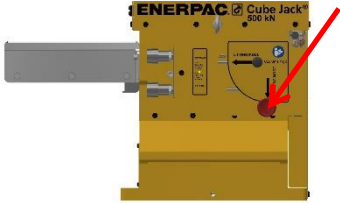
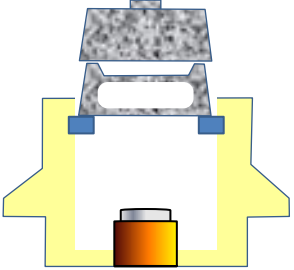
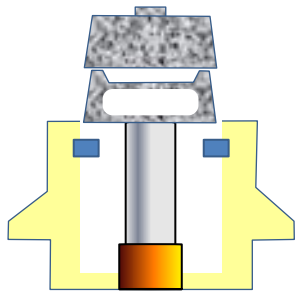
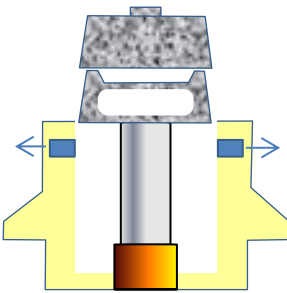
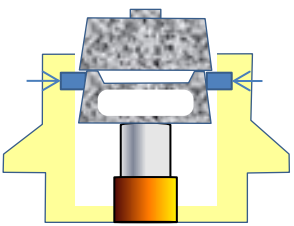
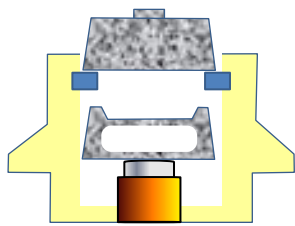
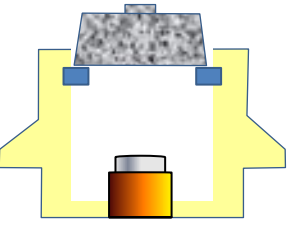

3.2.1 Lifting

The lifting sequence has the following phases:

 <p>1. Set the mode selecting lever to 'lifting'.</p>	 <p>2. Start position. The top block rests on the cylinder.</p>	 <p>3. The cylinder extends. The locks, following the contour of the top block, are pushed aside.</p>
 <p>4. The cylinder is fully extended. The cribbing block is lifted above the locks. The locks close by spring force.</p>	 <p>5. The cylinder retracts. The locks bear the weight of the cribbing block.</p>	 <p>6. A cribbing block is inserted by hand.</p>
 <p>7. The cylinder extends. The cribbing block pushes the top up. The weight of the tower is taken over by the cylinder.</p>	 <p>8. The cylinder is fully extended. The cribbing block is above the locks. The locks close by spring force.</p>	 <p>9. The cylinder retracts. The locks take over the weight of the tower.</p>
 <p>10. The cylinder is fully retracted.</p>	 <p>11. The cycle restarts from step 6</p>	

3.2.2 Lowering

The lowering sequence has the following phases:

 <p>1. Set the mode selecting lever to 'lowering'.</p>	 <p>2. Start position. The locks bear the tower.</p>	 <p>3. The cylinder extends and lifts the tower from the locks</p>
 <p>4. A switch is engaged in the last 4 mm. The locking cylinders are opened by hydraulic force.</p>	 <p>5. The cylinder retracts. After a few centimetres the pressure is released from the locking cylinders automatically. The locks close by spring force.</p>	 <p>6. The cylinder continues to retract. The weight of the top block is taken over by the locks.</p>
 <p>7. The cribbing block is taken out by hand.</p>	 <p>8. The cycle restarts from step 2</p>	

3.3 System specifications

3.3.1 Main specifications


Temperatures	Operating temperature	Min	-10 °C
		Max	+50 °C
	Storage temperature	Min	-25 °C
		Max	+60 °C
Hydraulic oil	Oil type	Shell HF-95	
	Purity	class 10 of NAS 1638 class 21/19/16 of ISO DIS 4406	
	Oil capacity	SCJ-50	1.3 l
SCJ-100		2.5 l	



Hazard: There is a risk of ice accretion at temperatures below 0° C. If ice has accreted on machine components, they cannot be used since they may lock up



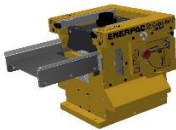
NB: Consult Enerpac if you want to apply the system by other temperatures


3.3.2 Functional specifications

Lifting	Capacity at max height	SCJ-50	500 kN per unit
		SCJ-100	1000 kN per unit
	max speed	2 - 6 m/h	
	starting height	SCJ-50	494 mm
		SCJ-100	558 mm
	max height	SCJ-50	200 cm
SCJ-100		300 cm	
max side load	max 1.5 % of the load		
Height adjusting range of the top block		0 - 50 mm	
Hydraulic power unit (<i>not part of the delivery</i>)		Working pressure 250 - 700 bar	
			Caution: when you apply pressure lower than the minimum, the locks may not operate well.

3.3.3 Dimensions

(More details can be found in Appendix G "Technical drawings SCJ-50 and SCJ-100".)

		Length x Width x Height		
Cribbing block	SCJ-50	310 x 300 x 131 mm	16 kg	
	SCJ-100	450 x 460 x 131 mm	23 kg	
Top block (Height adjusting to minimum)	SCJ-50	310 x 300 x 175 mm	40 kg	
	SCJ-100	450 x 460 x 189 mm	100 kg	
Unit (Transport position with insertion table stowed.)	SCJ-50	443 x 505 x 494 mm	360 kg	
	SCJ-100	705 x 772 x 558 mm	820 kg	

Transporting dimensions (Ex barrels)	SCJ-50	504 x 586 x 494 mm	680 kg	
	SCJ-100	???	820 kg	

3.4 Service conditions

The system is intended for lifting loads.

- Do not use the system for any other purpose.
- No alterations may be made to the system.
- Only use the system as it was delivered.



NB: The system is explicitly **not intended** for moving people.



Hazard: using the system for other purposes than the intended use may cause hazards to personnel and may cause damage to the equipment.

3.5 System configurations

- The system can be applied with different numbers of units. In all cases attention for stability of the lifting operation is required.



NB: Though this manual informs sufficient information how to use the system in a safe way, use of the system will always be the responsibility of the use.

- Hydraulic power unit is required but is not part of the delivery.

For compatibilities of cube jack systems and hydraulic power units reference is made to Appendix Z "Compatibility matrix".

4 Plan an operation

In this chapter, all planning activities for a lifting operation are described. Fully complete the checklist as given in A "Checklist for planning"



NB: It is of the utmost importance to read this whole chapter carefully before starting the lifting operation.

4.1 Preparations

1. Populate the checklist given in Appendix A "Checklist for planning" while you're planning

2. Make sure the following information is available:

Mass of the load.

Centre of gravity of the load.

Dimensions of the load.

3. Determine the maximum lifting height.



4. The maximum allowable side load (see section 3.3.2 "Functional specifications")

NB: The deflections of the load might cause side load into the system. These need to be considered in the total acceptable side load percentage. Especially for long and slender loads this effect can be significant.

5. Consider the following subjects:

Bearing capacity of the subsoil.

The wind load.

6. Define the dimensions of the drop zone



NB:

- It is of the utmost importance to read this whole chapter carefully before start the lifting operation.
- It is the responsibility of the customer that the foundation of the system is according the specifications.



Hazard: Failure to prepare correctly for a lifting operation may result in loss of system stability during use.

4.2 Ground bearing pressure and foundation



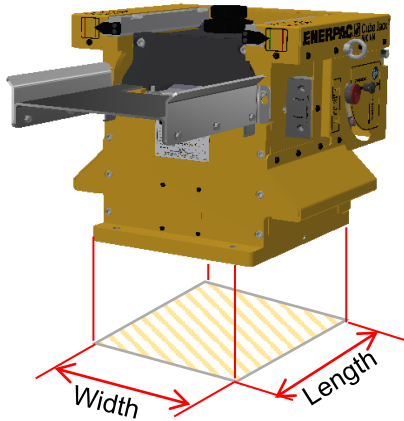
This chapter describes how you can calculate the ground bearing pressure.

NB: Feel free to apply your own calculation methods for ground bearing pressure.

Complete the checklist of Appendix A with the calculated maximum ground bearing pressure as well as the height of the foundation

4.3 Calculate the ground pressure without foundation

The dimensions of the bearing surface are shown in the following picture:



The ground pressure is calculated as follows:

1. Bearing surface = Length * Width
2. Ground pressure = $(F_{load} + Weight_{Unit} + Mass_{top\ block} + Mass_{cribbing\ blocks}) * Safety\ factor / Bearing\ surface$

Example of a calculation for the SCJ-50:

F_{load}	50mTe	
Mass _{unit}	360 kg	
Mass _{top block}	40 kg	
Mass _{cribbing block}	16 kg	
Number of cribbing blocks	11	
Safety factor	1,7	
Bearing ground surface	Width	0,455
	Length	0,356

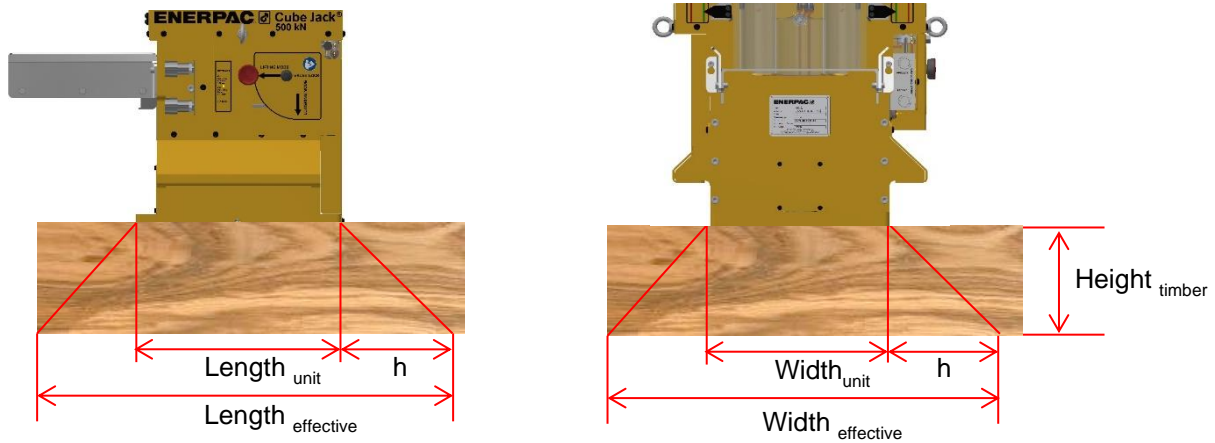
Bearing surface = $0,455 * 0,356 = 0,162 \text{ m}^2$

Total weight = $50 + 0,360 + 0,04 + (11 * 0,016) = 50,576 \text{ mTe}$

Ground pressure = $Total\ weight * 1,7 / 0,162 = 530 \text{ mTe} / \text{m}^2$

4.4 Calculate the ground pressure with foundation

Ground pressure can be reduced by applying a foundation. As an effect of applying foundation, the length and the width of the effective bearing surface are extended with twice the height of the foundation. This is illustrated below.



$$\begin{aligned} \text{Length}_{\text{effective}} &= (\text{Length}_{\text{unit}} + 2 * \text{Height}_{\text{timber}}) \\ \text{Width}_{\text{effective}} &= (\text{Width}_{\text{unit}} + 2 * \text{Height}_{\text{timber}}). \end{aligned}$$

The effective Bearing surface = $\text{Length}_{\text{effective}} * \text{Width}_{\text{effective}}$



NB: The ground pressure is inversely proportional with the height of the foundation.

Example of a calculation for the SCJ-50:

Total weight	= 50,576 kg (See calculation without foundation)
Height _{timber}	= 0,15 m
Bearing surface	= (0,455 + 2 * 0,15) * (0,356 + 2 * 0,15) = 0,50 m ²
Ground pressure	= 50,576 * 1,7 / 0,50 = 171 mTe / m²



NB: Exceeding the allowable ground pressure may cause loss of stability of the system, severe damage to the system and personal harm.

4.5 Requirements of foundation material

Permitted filler material for the foundation material is steel, load spreader crane mats and/or hard wood with a mechanical compressive strength of at least 25 N/mm² without any occurrence of deflection. However, Enerpac strongly recommends adhering to 30N/mm²; preferably Azobé. The minimum hard wood thickness is 50 mm and the maximum thickness is 150 mm.

Wood is a product of nature, which means its quality is not standardly assured. In order to guarantee quality an appropriate test has to be conducted before use to verify that the material meets the set requirements.

**NB**

- Wood is a natural product: its quality is not assured. In order to guarantee quality, test the timber on 125% of the expected load.
- For your planning keep in mind that suitable wood may not always be available immediately.

**Attention:**

- Construct the foundation in such a way that the force can spread down over 45° both in length and width direction.
- The foundation has to support the whole bearing surface of the unit.
- Do not allow gaps between the timbers below each bearing area!



Hazard: Use of other wood types such as plywood, multiply, pine and compressed wood will endanger the stability of the system. Therefore, use of other types is strictly forbidden. In case of doubt, consult Enerpac.



Caution: Minor deformations in filler material or subsoil may result in strong internal transverse forces or diagonal or longitudinal movements of the load or masts.

It is the responsibility of you as the customer that the foundation of the system is sufficient and according to the specifications.

5 Install the System


This chapter describes how to install the System as well as the preparations which have to be made for the working location.

Fully complete the checklist as given in Appendix B "Checklist for installing the system"


5.1 Mechanical

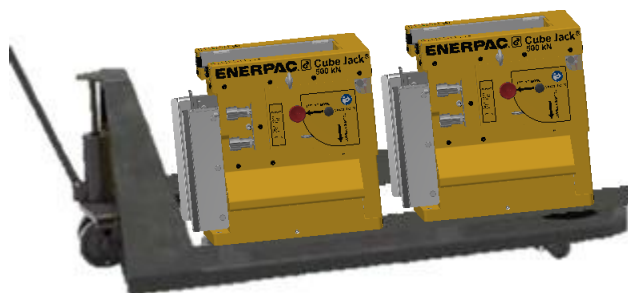
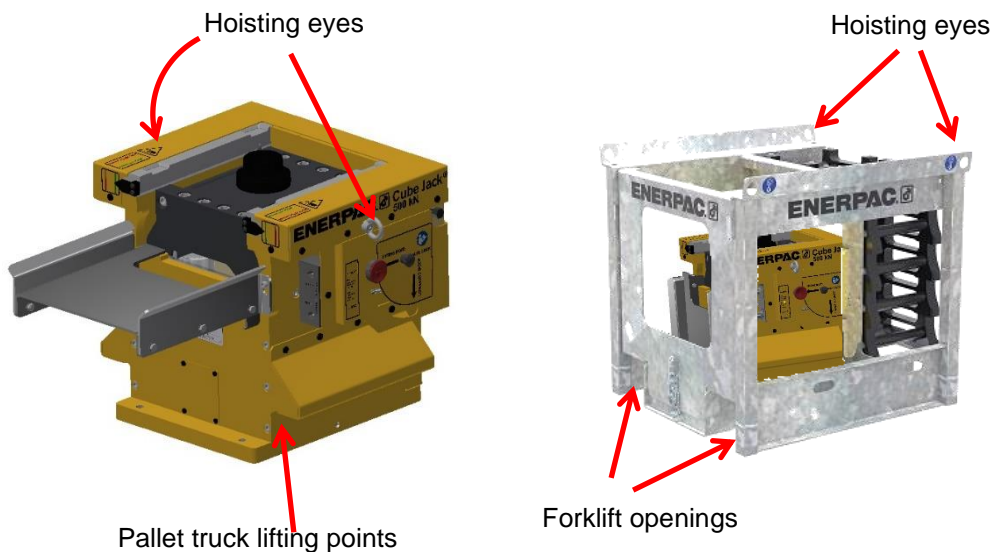
Position the system according to the requirement of your own lift plan. Ensure the COG of the load is positioned in such a way that the load is stable. Furthermore, the total capacity of the setup is less than the sum of the separate systems when the COG is not in the centre of the setup.

5.1.1 Hoisting Instructions

 **NB:** Verify the lifting capacity of your hoisting equipment with reference to the weight of the parts.

To move individual units and the transporting frame, use pallet truck, forklift or a crane.

 **NB:** Ensure that the toggle clamp of the transport frame is closed when lifting the frame.

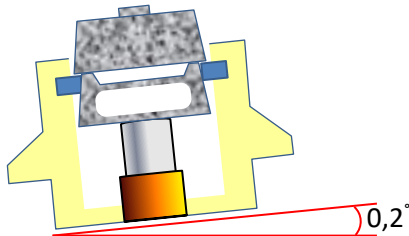


5.1.2 Positioning

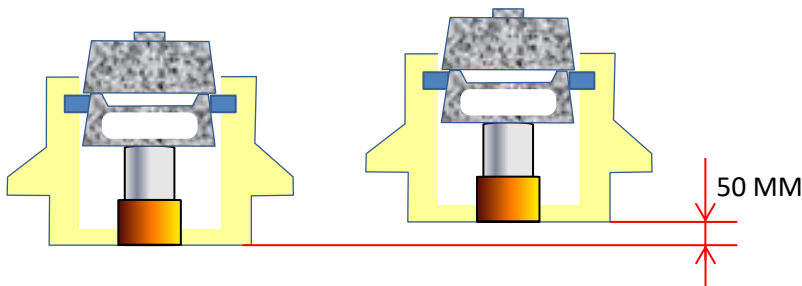
Locate the units according to your own requirements.

Observe the following requirements for positioning the units:

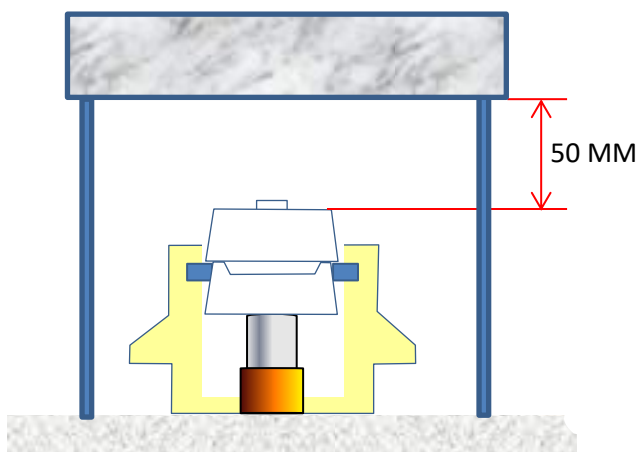
- The tilt of the units shall not exceed 0.2 degrees



- The difference in height of the units shall not exceed 50 mm. Only then the height in difference can be compensated by the adjusting mechanism of the saddles.



- When initially the load is at height then the gap between the top of the unit and the bottom of the load shall preferably be a multiple of the height of a cribbing block, with a tolerance of 50 mm. This enables contacting the load during positioning using the adjusting mechanism of the saddle.



5.1.3 Position the load

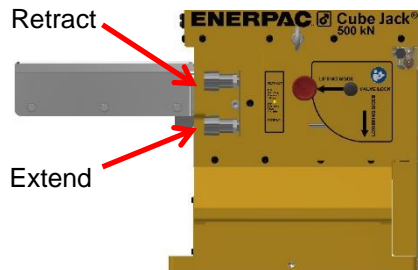
Put the load on top of the system.



Hazard: Do not use machine without swivel since the swivel distributes the load evenly on the machine.

5.2 Hydraulics

Connect the hydraulic hoses to the units according to the following picture:



NB: In order to verify that all cylinders are correctly connected, extend the cylinders of all units.



Hazard: When the couplings have not been tightened to the end, overpressure may occur which could damage the system

When using a compatible pump as listed in Appendix Z “Compatibility matrix”, ensure that the flow control valves on the pump are completely open, such that there is no pressure in the return line. When using a different pump or setup, ensure that there is no pressure in the return line.



Hazard: Failing to follow up on the above instructions might lead to malfunctioning and instability of the system which could lead to personal harm and damage to the system.

6 How to control the System

- Use the mode selecting lever to set the lifting mode (lifting or lowering).
- Use the insertion table to insert and to take out the cribbing blocks.
- When initially the load is at height, the tower of cribbing blocks should be build using the jack in lifting mode and building the tower using the jack. This ensures correct alignment of the tower with reference to the unit.



Hazard: Building the tower by hand without using the jack might result in incorrect alignment of the tower with respect to the unit. Instability of the system might occur which could lead to personal harm and damage to the system.



NB: Operating of the hydraulic power pack is not part of this manual.

6.1 Limiting devices

The system is not provided with any limiting device.

7 Execute an operation

This section describes how to perform a lifting operation.

Precondition is, that the system has been set to work completely, and that you are familiar with the operation of the system; see section 1.8 "Personnel and responsibilities".

7.1 Risks and Warnings

Proper handling of the System is essential for safety. Observe the following rules:

- Continuously check that the load is level. Use a theodolite for example.
- All people shall stand outside the dropzone when the load is hydraulically suspended.
- The maximum operation speed shall be such that there is sufficient time to interfere in case the lifting is not synchronous
- Make sure the working area is fenced off.

Address the following subjects:



Hazard

- **Improper use** of the machine may result in accidents causing damage not only to the machine itself, but also to objects and goods in its vicinity or mounted to the machine, as well as injuries to people in the immediate area, and possibly even death.
- Failure to adhere to the **checklists** may result in serious injury to the user, possibly even death.
- Even if all safety measures are taken and the system is operated correctly, there will remain a **residual risk** of falling of the system.



Caution

- Failure to **prepare correctly** for a lifting operation may result in total loss of machine stability during use.
- When lifting, always assume a **worst-case scenario**. The wind can be unpredictable, quickly changing speed and direction. Do not take any chances: if the wind is strong, that means it's a 'no go'!
- Do not operate the system when a **person is close** to it.



Attention

- It is of the utmost importance to **read this manual** carefully before setting up the machine. Failure to prepare correctly for a lifting operation may result in total loss of machine stability during use.
- Adhere to the **checklists** during all work activities: during preparation for the lifting operation, system construction, and for lifting the load.
- Ensure that the load avoids contact with any obstructions while lifting.
- The operator should have an unobstructed view of the system and load during operation of the system. If this is not possible, a signalperson shall be used with an effective means of communication to provide directions to the operator.
- Communication among personnel involved in the operation shall be maintained continuously during all movement of the load. If at any time communication is disrupted, the operator shall stop all movements until communication is restored.
- Signals to the operator should be in accordance with the standards prescribed in section 1.9 "Hand signals". If special signals are required, they shall be agreed upon by the operator and support personnel prior to the lifting operation. Signals shall be visible or audible at all times. No action shall be taken unless signs are clearly understood.
- Load handling personnel shall obey any stop signal.



NB: Pay attention to the "Hydraulic fluid safety information" as listed in Appendix E.



Hazard: Despite all inherent safe design measures, safeguarding and complementary protective measures, there will always be the **residual risk** of falling.



NB:

- It shall continuously be checked that the load is level. Use a theodolite for example
- All personnel shall stand outside the dropzone when the load is hydraulically suspended.
- The maximum operation speed shall be such that there is sufficient time to interfere in case the lifting is not synchronous.
- Always make sure that the mode selection levers of all units are in equal position.



Hazard: Make sure you insert the blocks correctly into the units. Inserting blocks in a wrong way may cause instability of the system, and may cause instability, severe damage and personal harm.


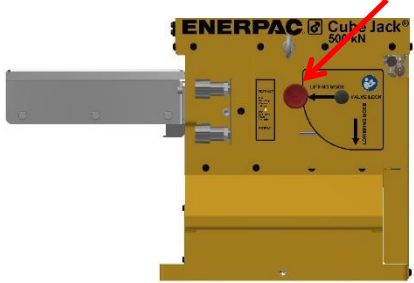
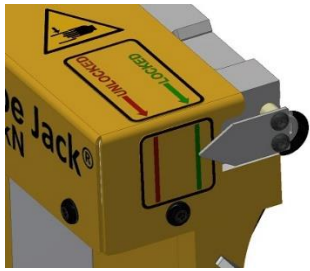
7.2 Warning signs on the System

The units are provided with the following warning signs:

			
			
	<table border="1"> <tr> <td data-bbox="917 1512 1069 1982"> <p>RETRACT</p> <p>Max. Operating Pressure: 700 Bar</p> <p>Max. Operating Flow: 0.9 L/Min.</p> <p>EXTEND</p> <p>SCJ-50</p> </td> <td data-bbox="1093 1512 1252 1982"> <p>RETRACT</p> <p>Max. Operating Pressure: 700 Bar</p> <p>Max. Operating Flow: 1.8 L/Min.</p> <p>EXTEND</p> <p>SCJ-100</p> </td> </tr> </table>	<p>RETRACT</p> <p>Max. Operating Pressure: 700 Bar</p> <p>Max. Operating Flow: 0.9 L/Min.</p> <p>EXTEND</p> <p>SCJ-50</p>	<p>RETRACT</p> <p>Max. Operating Pressure: 700 Bar</p> <p>Max. Operating Flow: 1.8 L/Min.</p> <p>EXTEND</p> <p>SCJ-100</p>
<p>RETRACT</p> <p>Max. Operating Pressure: 700 Bar</p> <p>Max. Operating Flow: 0.9 L/Min.</p> <p>EXTEND</p> <p>SCJ-50</p>	<p>RETRACT</p> <p>Max. Operating Pressure: 700 Bar</p> <p>Max. Operating Flow: 1.8 L/Min.</p> <p>EXTEND</p> <p>SCJ-100</p>		



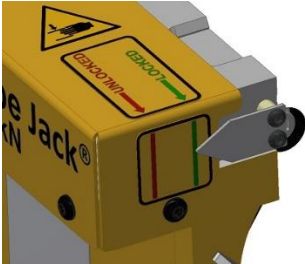
7.3 Lifting

For lifting, proceed as follows:

1.	Make sure the checklists are completed and signed off.	
2.	<p>Ensure that all units are fully retracted and put the mode selecting levers for all units in lifting position. Lock the levers with the locking pins.</p> <p> Hazard: Operating the system while the mode selecting levers are not in equal position may cause instability, severe damage and personal harm</p>	
3.	<p>Extend the cylinders of the units. <i>The application of a split-flow hydraulic power ensures equal strokes of all cylinders.</i></p> <p>Continue until the locks close. Verify that the locks close.</p>	
4.	<p>Retract the cylinders. <i>The weight of the load is taken over by the locks.</i></p>	
5.	Continue to retract the cylinders until they are in lowest position.	
6.	Insert a cribbing block.	
7.	Repeat from step 3 until the load reached the required height.	

7.4 Lowering

For lowering, proceed as follows:

1.	Make sure the checklists are completed and signed off.	
2.	<p>Ensure that all units are fully retracted and put the mode selecting levers for all units in lowering position. Lock the levers with the locking pins.</p> <p> Hazard: Operating the system while the mode selecting levers are not in equal position may cause instability, severe damage and personal harm</p>	
3.	<p>Ensure that there are no cribbing blocks in the units and fully extend the cylinders. <i>The locks will open automatically.</i></p>	
4.	Verify that all locks are open.	
5.	<p>Retract the cylinders a few centimetres. <i>The locks will close automatically.</i></p>	
6.	Verify that the locks are closed.	
7.	Continue to retract the cylinders until they cylinder are in lowest position.	
8.	Remove the cribbing block.	
9.	Repeat from step 3 until all cribbing blocks are removed.	

8 Solve problems

This chapter describes localization and solving of problems.

- A main problem localization procedure is given.
- A list of possible problems is given, together with causes and possible solutions.

8.1 Main problem localization procedure

In case of anomalies proceed as follows to solve the problem:

- Are there are mechanical blockades?
- Is any hydraulic leakage visible?

Call Enerpac if you need assistance.

8.2 List of problems and solutions

The table below lists a number of errors and problems which may appear during the use of the System, together with possible causes and solutions.

Symptom	Possible cause	What to do...
Main problems		
The locks do not automatically lock or unlock.	The mechanical locks are blocked by dirt or are corroded.	Check the locks. See 10.3.1 "Maintain the locks".
	A spring of a lock is broken	
A unit moves in the wrong direction.	The mode selecting lever is in wrong position.	Put the mode selecting lever in correct position. Use the locking pin to lock the lever.



Hazard: Performing repairs on the System may cause dangerous effects when not executed by well-skilled personnel.



NB: The table is meant as a first aid kit. Contact Enerpac if you need assistance.

9 Storage

9.1 System

When the system is stored then retract all jacks.

- Short term storage:
Cover the units with a tarpaulin in order keep them dry, especially when stored in open air.
- Long term storage:
Enerpac recommends a dry and closed space.

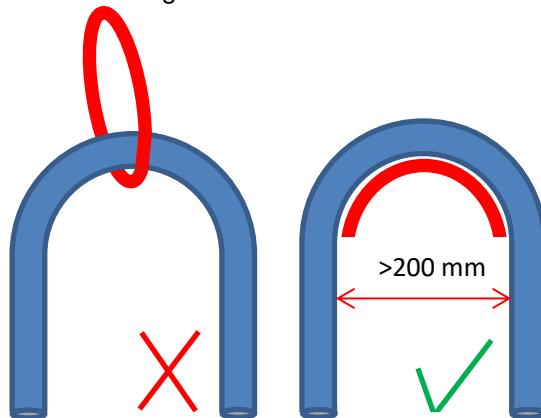
For storage temperature of the system reference is made to 3.3.1 "Main specifications".



NB: During storage in the open air, cover the units with a tarpaulin in order keep them dry, *The tarpaulin is not included in the delivery but can be added as an option.*

9.2 Hydraulic hoses

- Store hoses in a **frost-free**, cool, dry space with medium air humidity (condensation free).
- Keep hoses out of direct **sunlight** (UV radiation).
- Keep hoses out of the outlet flow of ventilators (drying effect).
- Protect hoses against exposure to **ozone** (released during welding work).
- Ozone causes accelerated ageing of hoses (splitting due to dryness).
- Protect hoses against dirt and **moisture**.
- Preferably store hoses in a **horizontal** position.
When you store the hoses in **vertical** position use hose brackets with a bend **radius** of at least 200 mm, or more for larger hose diameters.



10 Maintenance

Keep the machine in good condition to obtain optimum performance from your machine and to guarantee the safety of the users.

This chapter describes

- the maintenance jobs to be carried out
- the required skills for the maintenance jobs
- the time-intervals the jobs have to be performed in.
The time intervals are given for regular frequency of use and normal severity of service conditions. The time intervals have to be taken proportionally shorter when
 - the system is applied more often than regular, which is once per month.
 - the system is used in exceptional service conditions, like wet or salty environments
 - the system is applied to the limits of its capacity
 - the system is applied for special service. The time interval has to be discussed with Enerpac.

The time intervals may be varied based on experience gained on the service life of systems used in similar circumstances.

- If the system was idle for at least 6 months, all inspections as listed in the following section with a prescribed frequency of at least 6 months have to be performed.
- Prior to use, all new, altered, modified, or repaired parts shall be inspected to verify compliance with the applicable provisions of this section. Written records are not required.



NB:

- Only perform maintenance on the units if they are not under load
- Any maintenance procedures not detailed in this section can only be performed by or in consultation with Enerpac.
- For use of spare parts use reference is made to section 1.7 “Modifications”.



NB: If the system has been idle for more than 12 months than it shall be inspected prior to use completely.

10.1 Rules to be observed for maintenance

Due to the regulations as stated in Ref 7 “ASME B30.1-2015” observe the following rules for maintenance:

1. If the system was **idle** for at least 12 months, all inspections as listed in the following section with a prescribed frequency of at least 12 months must be performed.
2. Prior to use, all **new, altered, modified, or repaired** hydraulic components shall be inspected to verify compliance with the applicable provisions of this section. Written records are not required.
3. Only perform maintenance if the system is **not under load**.
4. Any maintenance procedures **not detailed** in this section can only be performed by or in consultation with Enerpac.
5. For use of spare parts use reference is made to section 1.7 “Modifications”.
6. Only perform maintenance work if you are **qualified** to do so. Unauthorized personnel may not open the Power pack.
7. Follow all **safety instructions** in this manual.
8. When working with **flammable liquids**, take the applicable safety regulations into account.
9. Make certain that you apply personal protection equipment (**PPE**) and take any other safety precautions required by the working conditions.
10. Make sure that you know the location of **fire alarms**, firefighting facilities and fire extinguishers.
11. Only use suitable work **equipment**. Prevent damage due to use of unsuitable equipment.
12. Without the express consent of the manufacturer, you are not allowed to make any **changes**, additions or adjustments to the system which affect the safety. This also applies to installation and adjustment of safety devices, covers and valves and to welding work on load-bearing parts.

10.2 Responsibilities

Due to the regulations as stated in Ref 7 “ASME B30.1-2015” observe the following rules for responsibilities.

The maintenance tables indicate for each maintenance job whether it has to be performed either by the owner or by the manufacturer.

Contact the manufacturer for the following maintenance work:

- Adjusting and repairing control valves for all main functions.
- Replacing parts.

In these cases, the maintenance work for the owner is limited to identification of a fault.

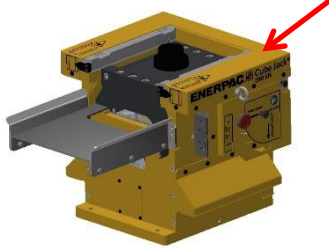

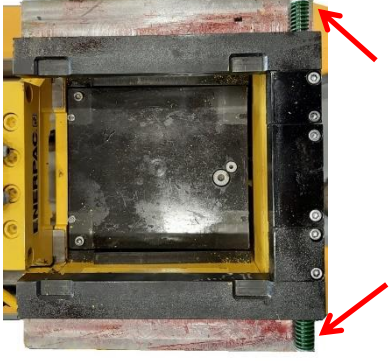
10.3 Mechanical

This section lists the maintenance jobs to be executed, as well as the frequencies.
When the system is intensively used, take shorter maintenance intervals.

Subject	Action	Person O (owner) EE (Enerpac expert)	First 40 hours	Before use	40 hours Weekly	Each 500 hours	2000 hours Every year	10000 hours Every 10 year	Remarks
1. Main construction									
1.1. Main construction	Visual check painting	O		x		x			
	Visual check on corrosion and damages	O		x	x				
	Check all bolts.	O				x			
	Visual check of the hoisting lugs	O				x			
	Inspect the readability of the warning signs. Clean if obscured by dirt. Restore if damaged or even no longer present	O					x		
1.2. Locks	Maintain the locks. See section 10.3.1 "Maintain the locks".	O					x		
1.3. Insert area and beneath cylinder	Maintain the insert area and the area underneath the cylinder. See section 10.3.2 "Maintain the insert area and the area beneath the "	O		x					

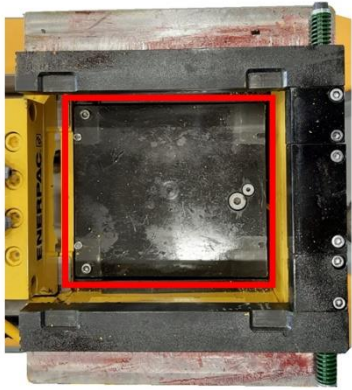

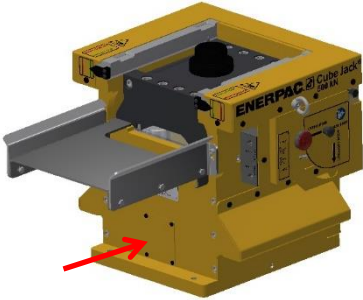
10.3.1 Maintain the locks

To maintain the locks, proceed as follows:

<p>1. Unscrew the bolts. Then remove the top cap of the unit</p>	
<p>2. Inspect the locking system visually Remove dirt and corrosion.</p> <p>3. The indicated areas have to be greased well. Eventually, add some grease.</p>	
<p>4. Inspect the springs. Are they not broken?</p>	

10.3.2 Maintain the insert area and the area beneath the cylinders

To maintain the insert area and the area beneath the cylinder, proceed as follows:

<p>1.</p>	<p>Use a brush or vacuum cleaner to clean the barrel insert area</p>	
<p>2.</p>	<p>Extend the cylinder and unscrew the cap</p>	
<p>3.</p>	<p>Use a brush or vacuum cleaner to clean the barrel insert area.</p> <p> Hazard: the cylinder is in extended position. Don't put your hands underneath it or use a support for the cylinder.</p>	

10.4 Hydraulics

This section lists all maintenance jobs for the hydraulics.

Record all activities in Appendix D "Logging Maintenance".

For hydraulic fluid safety information sheet, see Appendix E "Hydraulic fluid safety information".

Regard the following:

- Before starting maintenance, make sure no pressure is present in the hydraulic system.
- All inspections up to yearly have to be performed if the system has been idle for at least 12 months. The system shall only be returned to service when approved by a qualified person as described that section.
- All replacement parts including the ram, hoses, couplings, seals, valves, and caps shall meet or exceed the original equipment manufacturer's specifications.



NB: Enerpac strongly advises to apply parts as bought from Enerpac.



Hazard: Applying parts which do not apply to the specifications may cause hazards to personnel and the system. Before removing a component of the hydraulic system, check if there is no hydraulic pressure left within the hydraulic system



Hazard: High pressured hydraulic oil spray can cause physical injuries, fire or death of personnel

Subject	Action	Person O (Owner) EE (Enerpac expert)	First	Before use	40 hours	500 hours	2000 hours	10000 hours	Remarks
			40 hours	Before use	Weekly	yearly	2 years	10 years	
1. Hydraulic connections									
1.1. Pipes, hoses and brackets	Check on oil leakage and damages	O		x					
	Check if the couplings are tightened well.	O	x			x			
	Replace all seals within the piping (Walform)	EE						x	
	Replace all hoses	EE					x		
	Replace all plastic brackets	EE					x		
2. Lifting cylinder and locking cylinders									
2.1. Common	Check on leakages	O		x					
	Grease the bearings	EE			x				

11 Quality

Not applicable.

12 Dismantling the system

To dismantle the system at the end of its lifetime, proceed as follows:

- Drain hydraulic oil.
- Dismount rubber and plastic components.
- Dismount the metal components.

Collect all material, sort it and let it be recycled by a specialized company.



Attention: Dispose of all material in a responsible manner.

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Appendices

A. Checklist for planning

1. Project data

Project	
Customer	
Location	
Date	
Description	

2. Planning activities

<input type="checkbox"/>	Load	Mass	
<input type="checkbox"/>		Centre of gravity	
<input type="checkbox"/>		Dimensions	
<input type="checkbox"/>	Lifting height		
<input type="checkbox"/>	Maximum sideload		
<input type="checkbox"/>	Foundation	Bearing capacity of the ground	... mTe / m2
<input type="checkbox"/>		Ground pressure without foundation	... mTe / m2
<input type="checkbox"/>		Ground pressure with foundation	... mTe / m2
<input type="checkbox"/>		Correct foundation material (Azobé) applied	
<input type="checkbox"/>	Wind load		
<input type="checkbox"/>	Dropzone defined		

3. Commitment

Preparations by:

Date:

Signature:

Approved by:

Date:

Signature:

B. Checklist for installing the system

1. Project

Project	
Customer	
Location	
Date	
Description	

2. Mechanical and hydraulically

<input type="checkbox"/>	Checklist A “Checklist for planning” completed and signed off	
<input type="checkbox"/>	The lifting capacity of the hoisting equipment is sufficient with reference to the weight of the parts	
<input type="checkbox"/>	Positioning	tilt < 0.2 degrees
<input type="checkbox"/>		difference in height between the units < 50 mm
<input type="checkbox"/>		last cribbing block inserted by using the insertion table
<input type="checkbox"/>		
<input type="checkbox"/>	Hydraulic hoses are correctly connected	
<input type="checkbox"/>	A test was performed to verify the correct functioning of all units	
<input type="checkbox"/>	A dropzone has been fenced off	

3. Commitment

Installations by:

Date:

Signature:

Approved by:

Date:

Signature:

C. Recording a lifting operation

1. Project

Project	
Customer	
Location	
Date	
Description	

2. Recording of activities

	Activity	Time
<input type="checkbox"/>	The checklist in Appendix A “Checklist for planning” has been completed and signed off	
<input type="checkbox"/>	The checklist B “Checklist for installing the system” has been completed and signed off	
1		
2		
3		
4		
5		
6		
7		
8		

	Activity	Time
9		
10		
11		
12		
13		
14		
15		
16		
19		

3. Commitment

Executed by:

Date:

Signature:

Approved by:

Date:

Signature:

D.Logging Maintenance

Mechanical:

Subject	Action	Date	Remark
1. Main construction			
1.1. Main construction	Visual check painting		
	Visual check on corrosion and damages		
	Check all bolts.		
	Visual check of the hoisting lugs		
	Inspect the readability of the warning signs. Clean if obscured by dirt. Restore if damaged or even no longer present		
1.2. Locks	Maintain the locks.		

Hydraulics

Subject	Action	Date	Remark
1. Hydraulic connections			
1.1. Pipes, hoses and brackets	Check on oil leakage and damages		
	Check if the couplings are tightened well.		
	Replace all seals within the piping (Walform)		
	Replace all hoses		
	Replace all plastic brackets		
2. Cylinders			
2.1. Common	Check on leakages		
	Grease the bearings		

E. Hydraulic fluid safety information

HF-95 Hydraulic oil

Safety Data Sheet

according to Regulation (EC) No. 453/2010

Date of issue: 02/03/2004

Revision date: 10/02/2015

Supersedes: 24/02/2012

Version: 4.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	:	Mixture
Product name.	:	HF-95 Hydraulic Oil
Product group	:	Blend

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Main use category	:	Industrial use, Professional use, Consumer use
Industrial/Professional use spec.	:	Non-dispersive use Used in closed systems
Function or use category	:	Lubricants and additives

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Enerpac B.V.
 P.O. Box 8097, 6710 AB EDE
 THE NETHERLANDS
 Tel: +31(0)318 535911

1.4. Emergency telephone number

Emergency number	:	0032 (70) 245 245
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SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]
 Not classified

Classification according to Directive 67/548/EEC or 1999/45/EC
 Not classified

Adverse physicochemical, human health and environmental effects
 No additional information available

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP] EUH phrases	:	EUH210 - Safety data sheet available on request
--	---	---

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients
3.1. Substances

Not applicable

3.2. Mixture

Name	Product identifier	%	Classification according to Directive 67/548/EEC
Baseoil - unspecified	(CAS No) 64742-55-8 (EC no) 265-158-7	1 - 25	Not classified
Zinkalkyldithiophosphate	(CAS No) 68649-42-3 (EC no) 272-028-3 (REACH-no) 01-2119493635-27	0,1 - 0,5	Xi; R41 Xi; R38 N; R51/53
2,6-Di-tert-butylphenol	(CAS No) 128-39-2 (EC no) 204-884-0	0,1 - 0,25	Xi; R38 N; R50/53

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Baseoil - unspecified	(CAS No) 64742-55-8 (EC no) 265-158-7	1 - 25	Asp. Tox. 1, H304
Zinkalkyldithiophosphate	(CAS No) 68649-42-3 (EC no) 272-028-3 (REACH-no) 01-2119493635-27	0,1 - 0,5	Eye Dam. 1, H318 Aquatic Chronic 2, H411
2,6-Di-tert-butylphenol	(CAS No) 128-39-2 (EC no) 204-884-0	0,1 - 0,25	Skin Irrit. 2, H315 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Full text of R-, H- and EUH-phrases: see section 16

SECTION 4: First aid measures
4.1. Description of first aid measures

First-aid measures after inhalation	:	Not expected to require first aid measures.
First-aid measures after skin contact	:	Wash skin with mild soap and water.
First-aid measures after eye contact	:	In case of eye contact, immediately rinse with clean water for 10-15 minutes.
First-aid measures after ingestion	:	Do not induce vomiting. Rinse mouth. Get immediate medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation	:	Not expected to present a significant inhalation hazard under anticipated conditions of normal use.
Symptoms/injuries after skin contact	:	Not expected to present a significant skin hazard under anticipated conditions of normal use.
Symptoms/injuries after eye contact	:	Not expected to present a significant eye contact hazard under anticipated conditions of normal use.
Symptoms/injuries after ingestion	:	Not expected to present a significant ingestion hazard under anticipated conditions of normal use.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures
5.1. Extinguishing media

Suitable extinguishing media	:	Water fog, Foam, Powder, Dry chemical product.
Unsuitable extinguishing media	:	Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

No additional information available

5.3. Advice for firefighters

Precautionary measures fire	:	Exercise caution when fighting any chemical fire.
Firefighting instructions	:	Use water spray or fog for cooling exposed containers.
Protection during firefighting	:	Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel Protective equipment	:	Wear suitable protective clothing and gloves.
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6.1.2. For emergency responders

Protective equipment	:	Wear suitable protective clothing and gloves.
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6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment	:	Impound and recover large spill by mixing it with inert granular solids.
Methods for cleaning up	:	Detergent. Take up liquid spill into absorbent material sand, saw dust, kieselguhr.
Other information	:	Spill area may be slippery. Use suitable disposal containers.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Precautions for safe handling	:	Avoid all unnecessary exposure. Both local exhaust and general room ventilation are usually required.
Handling temperature	:	< 40 °C
Hygiene measures	:	Wash hands and other exposed areas with mild soap and water before eat, drink or smoke and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Storage temperature	:	< 40 °C
Storage area	:	Store in dry, cool, well-ventilated area.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal

8.1. Control parameters

	: 5 mg/m ³ for oil mists (TWA, 8h-workday) recommended, based upon the ACGIH TLV (Analysis according to US NIOSH Method 5026, NIOSH Manual of Analytical Methods, 3rd Edition).
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8.2. Exposure controls

Personal protective equipment	: Safety glasses. Gloves.
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Hand protection	: Wear suitable gloves resistant to chemical penetration.
Skin and body protection	: No special clothing/skin protection equipment is recommended under normal conditions of use.
Respiratory protection	: No special respiratory protection equipment is recommended under normal conditions of use with adequate ventilation.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Oily liquid.
Colour	: Blue
Odour	: Characteristic.
Odour threshold	: No data available
pH	: No data available
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: No data available
Flash point	: > 180 °C @ ASTM D92
Self ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapour pressure	: No data available
Relative vapour density at 20 °C	: No data available
Relative density	: No data available
Density	: 872 kg/m ³ @ 15°C
Solubility	: Slightly soluble, the product remains on the water surface.
Log Pow	: No data available
Viscosity, kinematic	: 32 mm ² /s @ 40°C
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidising properties	: No data available
Explosive limits	: No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

None under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

F. Torque settings

Inspect all bolt joints which may pose a hazard to people and machines at fixed intervals and check their torque.

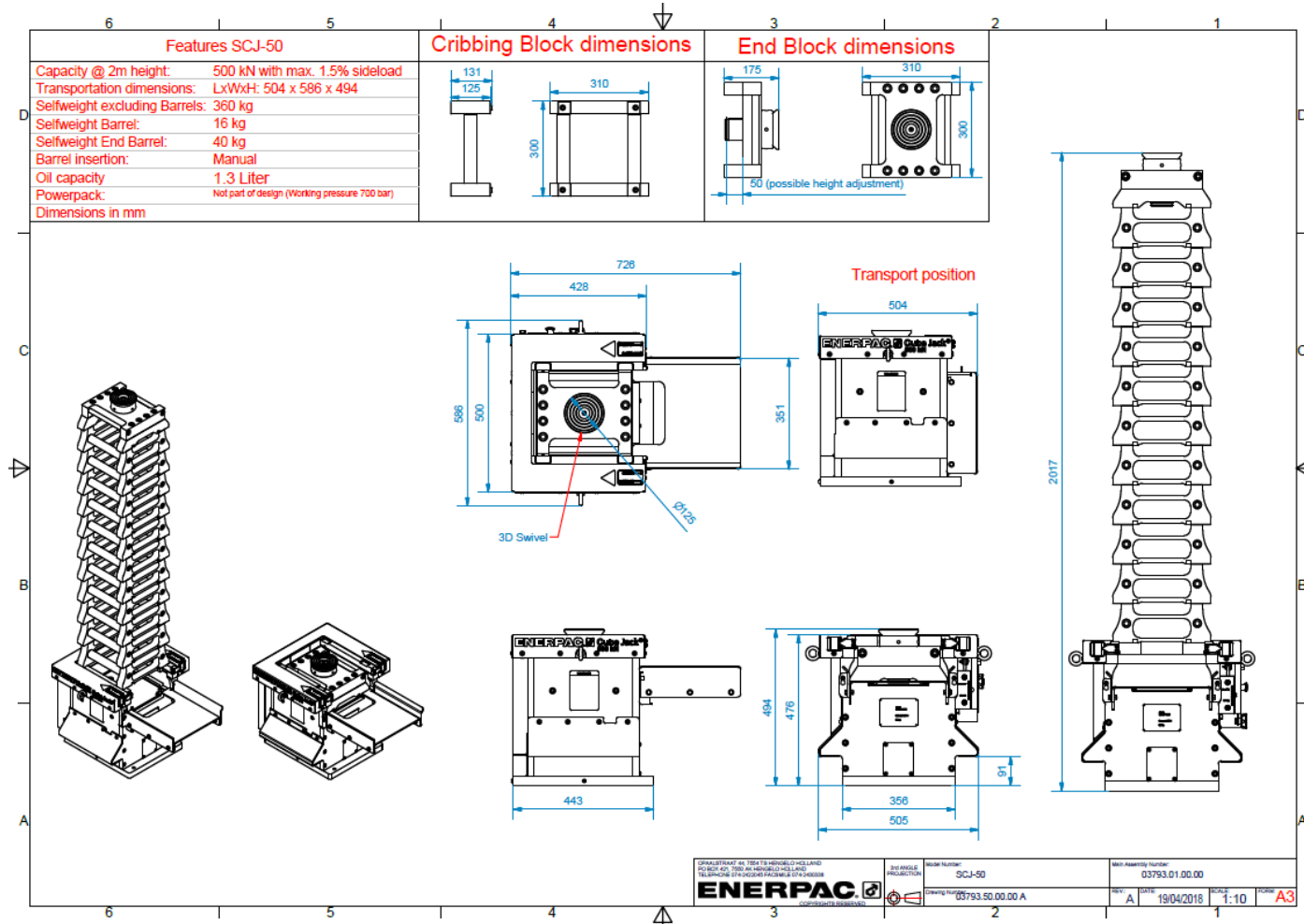
Apply the torque values unless indicated otherwise on the drawing.

Nominal size	Strength class	Course pitch [Nm]	Fine pitch [Nm]
		(Copper-grease)	(Copper-grease)
		0.08	0.08
M4	8.8	2.2	
	10.9	3.2	
	12.9	3.8	
M5	8.8	4.3	
	10.9	6.3	
	12.9	7.4	
M6	8.8	7.4	
	10.9	10.9	
	12.9	12.5	
M7	8.8	12.0	
	10.9	17.5	
	12.9	20.5	
M8	8.8	18	19
	10.9	26	28
	12.9	31	32
M10	8.8	36	37
	10.9	52	55
	12.9	61	64
M12	8.8	61	63
	10.9	90	93
	12.9	105	109
M14	8.8	97	103
	10.9	145	150
	12.9	165	175
M16	8.8	145	155
	10.9	215	225
	12.9	250	270
M18	8.8	210	230
	10.9	300	330
	12.9	350	380
M20	8.8	300	320
	10.9	420	460

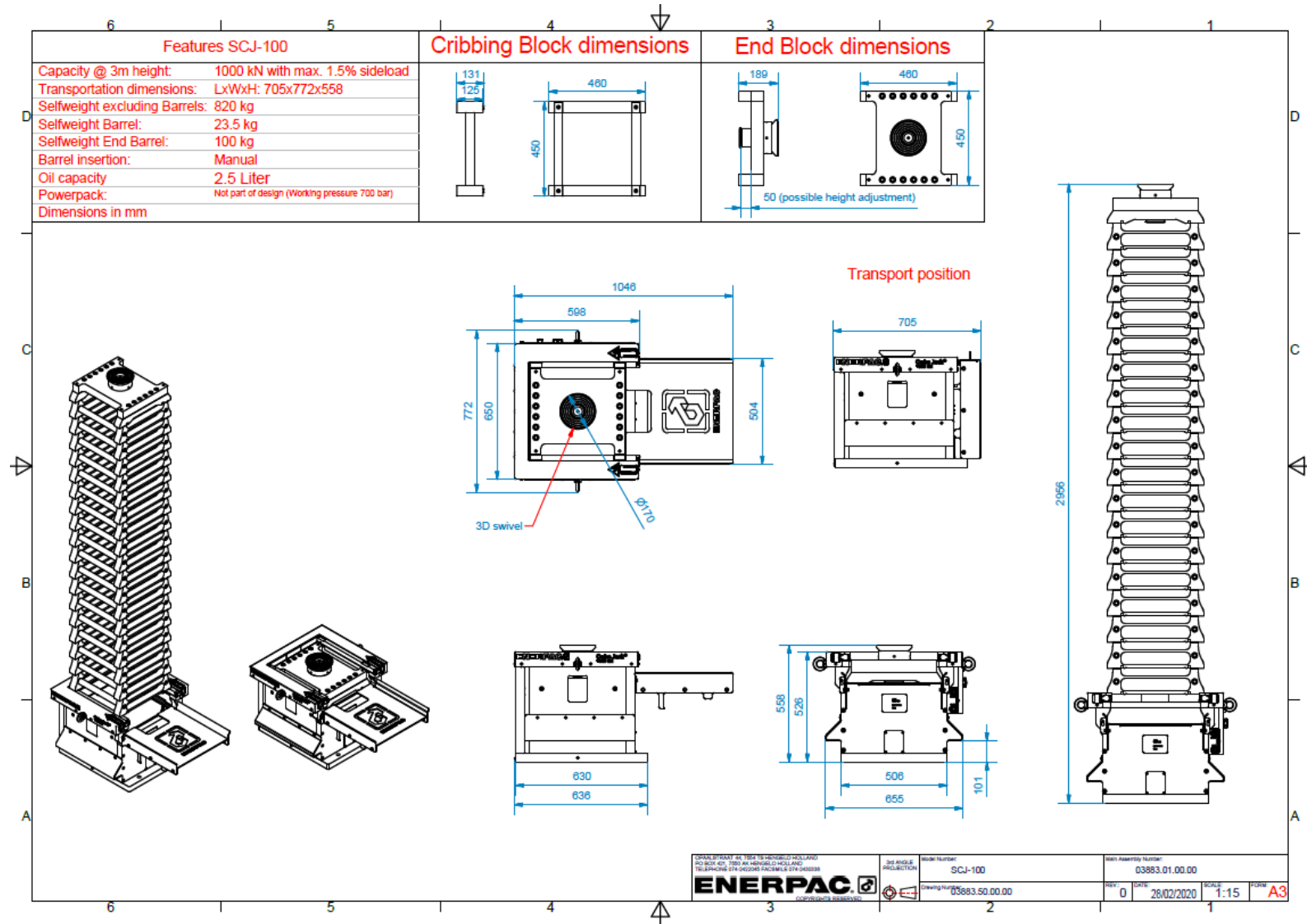
Nominal size	Strength class	Course pitch [Nm]	Fine pitch [Nm]
		(Copper-grease)	(Copper-grease)
		0.08	0.08
	12.9	500	530
M22	8.8	400	430
	10.9	570	610
	12.9	670	710
M24	8.8	510	640
	10.9	730	900
	12.9	850	1060
M27	8.8	750	920
	10.9	1070	1310
	12.9	1250	1530
M30	8.8	1000	1280
	10.9	1450	1820
	12.9	1700	2130
M33	8.8	1400	1700
	10.9	1950	2430
	12.9	2300	2840
M36	8.8	1750	2230
	10.9	2500	3170
	12.9	3000	3710
M39	8.8	2300	2850
	10.9	3300	4050
	12.9	3800	4740

G. Technical drawings SCJ-50 and SCJ-100

SCJ-50:



SCJ-100:



Z. Compatibility matrix

The following hydraulic power units are certified by Enerpac and can be applied for the system:

Number of applied units	Applicable Enerpac Hydraulic Power Units	
	SCJ-50	SCJ-100
Up to max 4 Cube Jack Systems	SFP 404SW SFP 404SJ SFP 409SW SFP 409SJ EVOB408E EVOB408W EVOB408B EVOB408G EVOB408J EVOB408R EVO421380 EVO421380W EVO440380 EVO440380W EVO421460 EVO421460W EVO440460 EVO440460W	SFP 404SW SFP 404SJ SFP 409SW SFP 409SJ SFP 414SW SFP 414SJ EVOB408E EVOB408W EVOB408B EVOB408G EVOB408J EVOB408R EVOB416E EVOB416W EVOB416B EVOB416G EVOB416J EVOB416R EVO421380 EVO421380W EVO440380 EVO440380W EVO421460 EVO421460W EVO440460 EVO440460W
Up to max 6 Cube Jack Systems	SFP 604SW SFP 604SJ	SFP 604SW SFP 604SJ SFP 613SW SFP 613SJ

<p>Up to max 8 Cube Jack Systems</p>	<p>EVOB808E EVOB808W EVOB808B EVOB808G EVOB808J EVOB808R EVO821380 EVO821380W EVO840380 EVO840380W EVO821460 EVO821460W EVO840460 EVO840460W</p>	<p>SFP 813SW SFP 813SJ EVOB808E EVOB808W EVOB808B EVOB808G EVOB808J EVOB808R EVOB816W EVOB816G EVOB816J EVOB816R EVO821380 EVO821380W EVO840380 EVO840380W EVO821460 EVO821460W EVO840460 EVO840460W</p>
<p>Up to max 12 Cube Jack Systems</p>	<p>EVO1221380 EVO1221380W EVO1240380 EVO1240380W EVO1221460 EVO1221460W EVO1240460 EVO1240460W</p>	<p>EVO1221380 EVO1221380W EVO1240380 EVO1240380W EVO1221460 EVO1221460W EVO1240460 EVO1240460W</p>

Other pumps may be applied, but Enerpac only guarantees CE (2A) certification of these configurations.



NB: In case of any uncertainty, please contact Enerpac for advice.