



Operation and Maintenance Manual

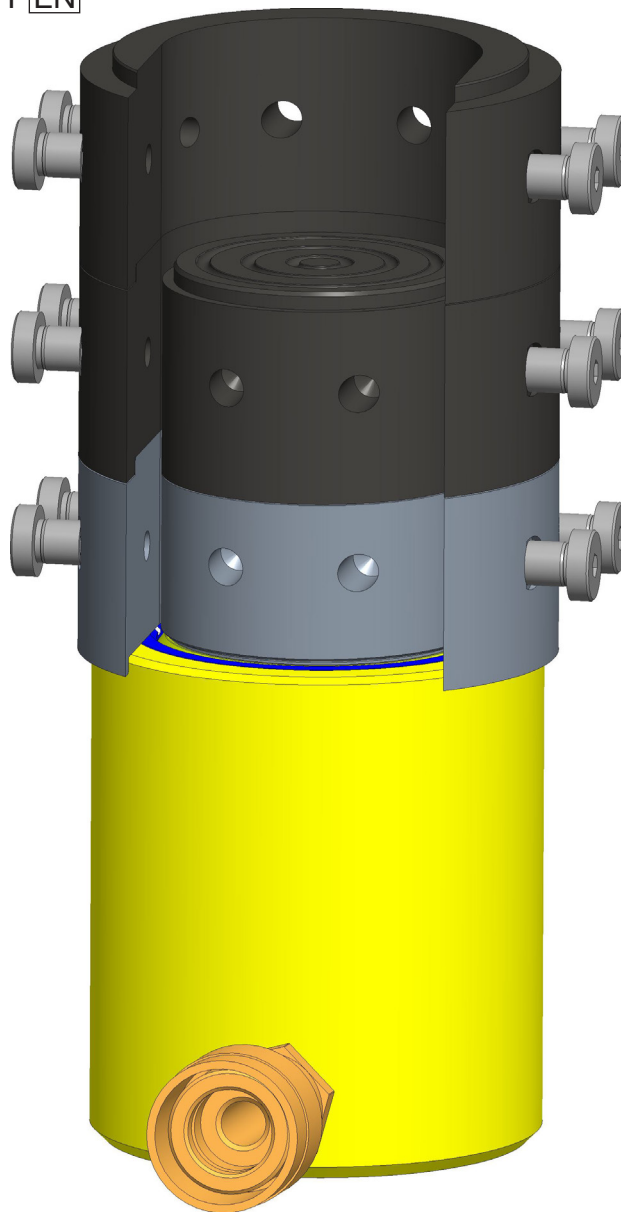
Enerpac CR30S, CR50S, CR100S Cribbing Ring Set

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To reduce the risk of injury, user must read and understand this document before use.

ABOUT US

Enerpac is a global market leader in high pressure hydraulic tools, controlled force products, portable machining, on-site services and solutions for precise positioning of heavy loads. As a leading innovator with a 100-year legacy, Enerpac has helped move and maintain some of the largest structures on earth. When safety and precision matters, elite professionals in industries such as aerospace, infrastructure, manufacturing, mining, oil & gas and power generation rely on Enerpac for quality tools, services and solutions. For additional information, visit www.enerpac.com.



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WARRANTY

Refer to the Enerpac Global Warranty document for terms and conditions of the product warranty. Such warranty information can be found at www.Enerpac.com.

NAMEPLATE



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1. Safety

Read all instructions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the product and / or damage to other property. Enerpac cannot be responsible for any damage or injury from unsafe use, lack of maintenance, or incorrect operation. Do not remove warning labels, tags, or decals. In the event that any questions or concerns arise, contact Enerpac or a local Enerpac distributor for clarification.

Save these instructions for future use.

If you have never been trained on high-pressure hydraulic safety, consult your distributor or service center for information about Enerpac Hydraulic Safety Courses.

This manual follows a system of safety alert symbols, signals, words, and safety messages to warn the user of specific hazards. Failure to comply with these warnings could result in death or serious personal injury, as well as damage to the equipment or other property.



The Safety Alert Symbol appears throughout this manual. It is used to alert you to potential physical injury hazards. Pay close attention to Safety Alert Symbols and obey all safety messages that follow this symbol to avoid the possibility of death or serious injury.

Safety Alert Symbols are used in conjunction with certain Signal Words that call attention to safety messages or property damage messages and designate a degree or level of hazard seriousness. The Signal Words used in this manual are DANGER, WARNING, CAUTION, and NOTICE.

⚠ DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious personal injury.

⚠ WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious personal injury.

⚠ CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate personal injury.

NOTICE Indicates information considered important, but not hazard related (e.g. messages related to property damage). Please note that the Safety Alert Symbol will not be used with the signal word.

1.1 Safety Precautions



Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Read and completely understand the safety precautions and instructions in this manual before operating the cylinder or preparing it for use. Always follow all safety precautions and instructions, including those that are contained within the procedures of this manual.
- Operating procedures will vary, depending on the system arrangement and the specific components being used. Always read, follow and completely understand all manufacturer's instructions when operating pumps, valves and all other devices used with the cylinders. Follow all safety precautions contained in the manufacturer's manuals.
- Always wear appropriate personal protective equipment (P.P.E.) when operating hydraulic equipment. Be sure to wear eye protection, work gloves and protective clothing. Use of additional P.P.E. safety items such as dust mask, non-skid safety shoes, hard hat, and hearing protection (used as appropriate for the conditions) will reduce the chance of personal injuries. The use of these items may also be required by local regulations or laws.
- Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin. If oil is injected under the skin, see a doctor immediately.
- Do not pressurize disconnected couplers.
- Use hydraulic cylinders only in a coupled system. It is acceptable to use a cylinder with a disconnected coupler only if the load is mechanically supported by the cylinder lock nut, and all hydraulic pressure is completely relieved.
- When holding loads, be certain that the cribbing U-rings are properly seated and aligned on the cylinder base so that the load is mechanically supported. Also be sure that all hydraulic pressure is completely relieved.
- The system operating pressure must not exceed the pressure rating of the lowest rated component in the system.
- Install pressure gauge(s) in the system to monitor operating pressure. It is your window to see what is happening in the system.
- Never set a relief valve to a higher pressure than the maximum rated pressure of the pump and cylinder. If ratings are different, relief valve setting should not exceed the setting of the lowest rated component (pump or cylinder).
- Do not exceed equipment ratings. Never attempt to lift a load weighing more than the rated capacity of the cylinder. Overloading may cause equipment failure and possible personal injury.
- Be sure setup is stable before lifting load. Cylinders should be located on a firm and level surface capable of supporting the full load.
- Where applicable, use a cylinder base plate to provide added stability.
- Do not weld, drill or otherwise modify a cylinder to attach a base plate or other support unless approved in writing by Enerpac Engineering Department. Use only the provided bolt holes.
- Always perform a visual inspection of the cylinder before placing it into operation. If any problems are found, do not use the cylinder. Have the cylinder repaired and tested before it is returned to service.

- Never use a cylinder that is leaking oil. Do not use a cylinder that is damaged, altered or in need of repair.
- Allow only trained and experienced personnel to supervise and perform lifting and lowering procedures.
- Be certain that no persons are working on or near any cylinders before lifting or lowering of the load begins. Alert all personnel in advance that lifting or lowering is about to occur.
- Never use a hydraulic cylinder as a shim or spacer in any lifting or pressing application.
- Be certain that the load is centered and covers the entire plunger saddle surface. Avoid situations where loads are not directly centered on the plunger saddle. The load may slip or fall, causing potential danger. **Make sure the load covers the whole surface of the cylinder, and not only the plunger, as it will stay on top of the U-rings.**
- Lift only dead weight loads. Avoid lifting live weight loads.
- Be especially careful when lifting loads such as partially filled storage tanks, in which the center of gravity could move or shift during lifting. Be aware that the distribution of some loads can change quickly and without warning.
- Do not use the cylinder to lift people. Do not allow people to be on top of the load during lifting or lowering.
- Keep all personnel clear of the work area while lifting or lowering is in progress. To avoid personal injury, keep hands and feet away from cylinder and load during operation.
- Maintain communication with the operator at all times during lifting or lowering to avoid accidents. Use hand signals, two-way radios or other appropriate forms of communication (as required by applicable laws and regulations) if the load is not visible to the operator.
- Operate pump and valve as required to ensure that the load is lifted and lowered evenly and at a controlled rate.
- Closely watch the load at all times during lifting and lowering. Stop lifting or lowering immediately if the load becomes unstable or appears to be lifting or lowering unevenly.
- Stay clear of loads supported only by hydraulics. As required, follow the lifted load with cribbing.
- Never allow persons to work under or near the load while the load is being supported hydraulically. After the load has been raised or lowered, it always must be blocked mechanically by the cylinder lock nut or via suitable cribbing.
- Always be certain that hydraulic pressure is fully relieved and that the load is fully removed from the cylinder(s) before disconnecting hydraulic hoses, loosening hydraulic fittings, or performing any cylinder disassembly or repair procedures.
- Use the Cribbing Ring Set only with the cylinder it was designed for: CR30S with RCS302, CR50S with RCS502 and CR100S with RCS 1002. Refer to L1608 - Hydraulic Cylinders Instruction Sheet for installation and operation of the corresponding hydraulic cylinder: RCS302, RCS502, RCS1002.
- The total load supported by the cribbing U-rings must not exceed the cylinder ratings. Good

practice encourages using only 80% of these ratings, considering that the load may rest only on three of the 4 cylinders on a 4 point lifting job on the U-rings.

- It is recommended to use a minimum of three points of support, taking into account the position of the center of gravity. Always center the load evenly on the cylinder, U-rings and spacers.
- Make sure U-rings seat securely on the cylinder base and ensure the U-rings are stable when stacked.
- Side load capacity is limited to 5% on the complete set. If an additional U-ring and spacer are used, side load capacity is reduced to 3%.

⚠ CAUTION

Failure to observe and comply with the following precautions could result in minor or moderate personal injury. Property damage could also occur.

- Be careful to avoid damaging hydraulic hoses. Avoid sharp bends and kinks when routing hydraulic hoses. Do not exceed the minimum bend radius specified by the hose manufacturer. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose, leading to premature hose failure.
- Do not drop heavy objects on hoses. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
- Do not lift hydraulic equipment by the hoses or couplers. Use the cylinder lifting eyes and appropriately rated lifting equipment.
- Keep hydraulic equipment away from flames and heat. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings.
- For optimum performance, do not expose hydraulic equipment to temperatures of 150°F [65°C] or higher. Protect all hydraulic equipment from weld spatter.
- Immediately replace worn or damaged parts with genuine Enerpac parts. Enerpac parts are designed to fit properly and to withstand high loads. Non-Enerpac parts may break or cause the product to malfunction.

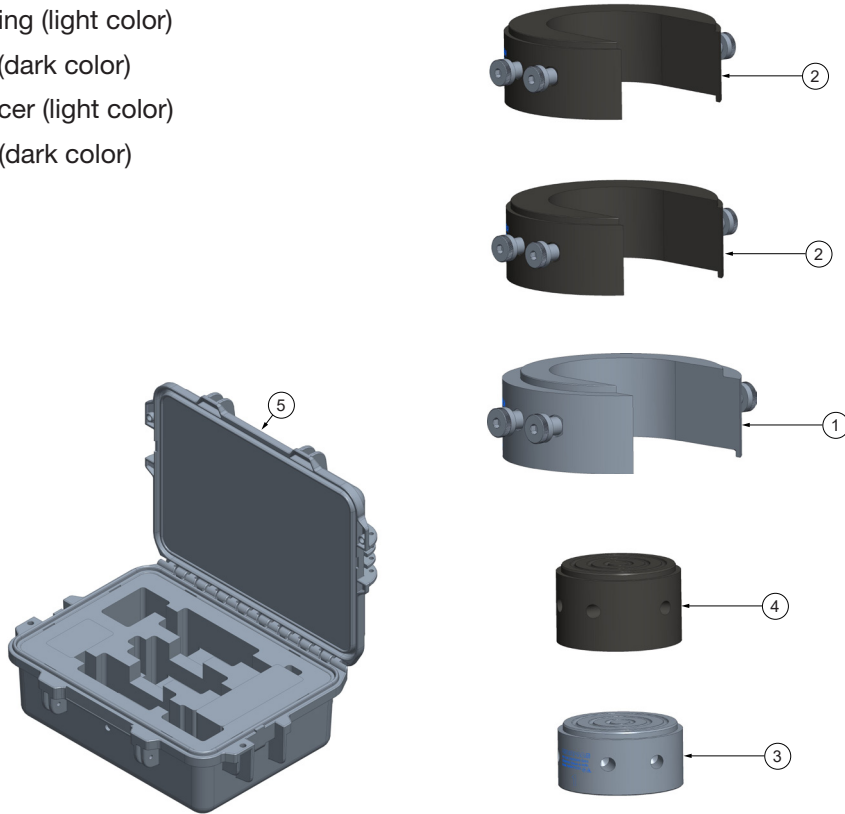
NOTICE

Failure to observe and comply with the following precautions could result in property damage and/or void the product warranty.

- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Center in your area.
- To help ensure proper operation and best performance, use of Enerpac oil is strongly recommended.

2. Components

1. Bottom U-Ring (light color)
2. Top U-Ring (dark color)
3. Bottom Spacer (light color)
4. Top Spacer (dark color)
5. Flight Case



3. Technical Product Data

3.1 Product Description

Enerpac Cribbing Ring Set (CRS) is a modular support system designed to be used with hydraulic cylinders in lifting and positioning applications. Each set is composed of interlocking U-shaped rings to create a stable, elevated platform beneath the load and flat spacers to increase the lift height of the cylinder.

CR30S and CR50S include 1 bottom spacer, 1 top spacer, 1 bottom U-ring and 2 top U-rings.

CR100S includes 1 bottom spacer, 2 top spacers, 1 bottom U-ring and 3 top U-rings.

The U-rings are designed to stay in place when stacked, preventing lateral movement and maintaining alignment during operation.

The bottom ring and bottom spacer (light color and marked as 1) are designed to be placed on top of the cylinder providing safe, reliable support for lifting operation. The top U-rings and top spacers (dark color) are designed to be placed on top of the bottom ones.

A positioning fork (CRF150) is available as an accessory. The fork is a handling tool designed to safely place and accurately adjust the U-rings and spacers. It is recommended to always use the fork to keep fingers, hands or other body parts away from the load.

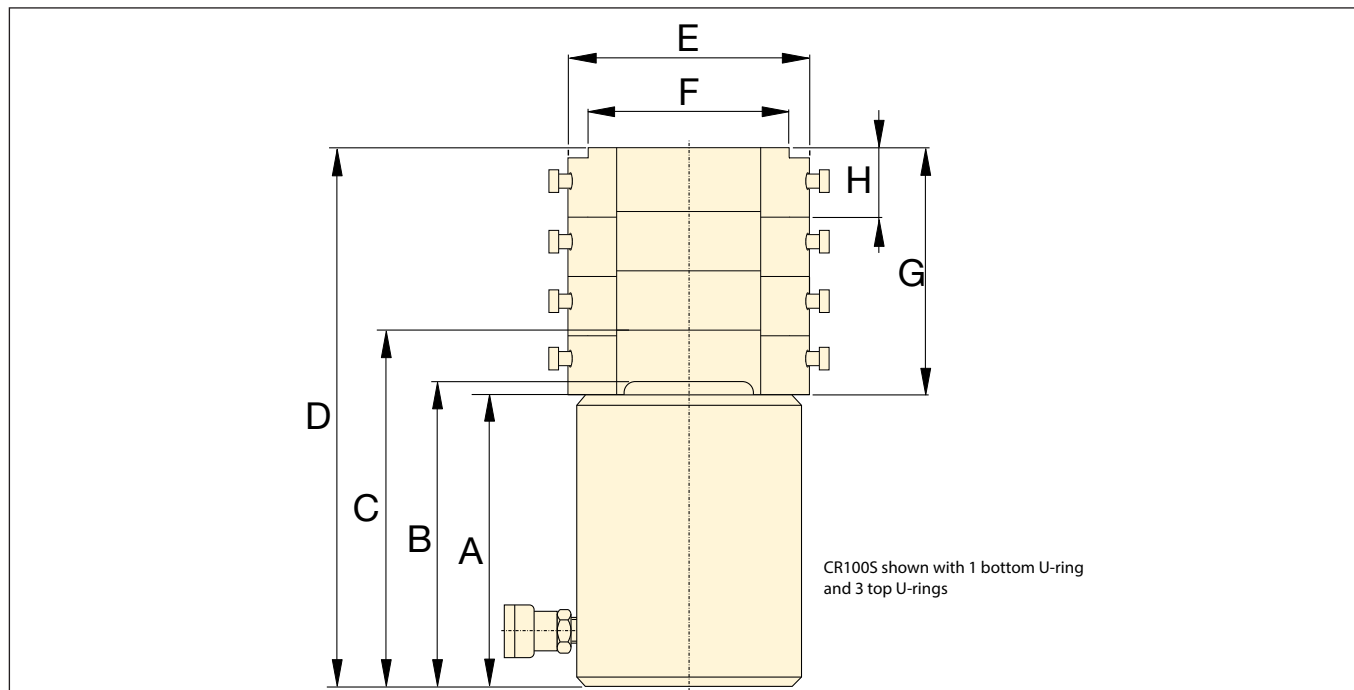
CRS can use an additional U-ring and spacer, and the CR100S can use two additional U-rings and spacers. Using these, side load capacity is reduced from 5% to 3%. Refer to Section 6 - Parts List.

3.2 Technical Specifications

Cribbing Ring Set	CR30S		CR50S		CR100S	
Cylinder	RCS302		RCS502		RCS1002	
Max. Capacity	295 kN	30 t	435 kN	50 t	887 kN	90 t
Set Cribbing Height *	132 mm	5.20 in	129 mm	5.08 in	168 mm	6.61 in
Max. Cribbing Height **	176 mm	6.93 in	172 mm	6.77 in	252 mm	9.92 in
Cribbing Ring Set Weight	10 kg	22 lb	12 kg	26.5 lb	25 kg	55 lb
U-Ring Height	44 mm	1.73 in	43 mm	1.69 in	42 mm	1.65 in
U-Ring Weight	1.1 kg	2.4 lb	2.4 kg	5.3 lb	3.5 kg	7.7 lb
Bottom Spacer Height	37 mm	1.46 in	36 mm	1.42 in	35 mm	1.38 in
Bottom Spacer Weight	1.06 kg	2.34 lb	1.18 kg	2.60 lb	1.99 kg	4.39 lb
Top Spacer Height	44 mm	1.73 in	43 mm	1.69 in	42 mm	1.65 in
Top Spacer Weight	1.27 kg	2.80 lb	1.43 kg	3.15 lb	2.42 kg	5.34 lb

* Set cribbing height is achieved with 3 U-rings for CR30S and CR50S and with 4 U-rings with CR100S.
 ** Maximum cribbing height is achieved with 4 U-rings for CR30S and CR50S and with 6 U-rings with CR100S.

3.3 Dimensions



Measure	CR30S		CR50S		CR100S	
	mm	in	mm	in	mm	in
A	114	4.51	120	4.73	140	5.52
B	117	4.63	122	4.81	141	5.56
C	158	6.22	163	6.42	182	7.17
D	246	9.70	249	9.80	308	12.12
E	107	4.21	130	5.12	171	6.73
F	93	3.66	11	4.33	143	5.63
G	132	5.19	129	5.07	168	6.60
H	44	1.73	43	1.68	42	1.65

4. Operation

4.1 Operating Precautions

⚠ WARNING

- Use the Cribbing Ring Set only with the cylinder it was designed for: CR30S with RCS302, CR50S with RCS502 and CR100S with RCS 1002. Refer to L1608 - Hydraulic Cylinders Instruction Sheet for installation and operation of the corresponding hydraulic cylinder: RCS302, RCS502, RCS1002.
- The total load supported by the cribbing U-rings must not exceed the cylinder ratings. Good practice encourages using only 95% of these ratings.
- Make sure setup is stable before lifting the load. Use a cylinder base plate to provide added stability. Maximum allowable floor gradient is 0.2°.
- **Make sure the load covers the whole surface of the cylinder, and not only the plunger, as it will stay on top of the U-rings.**
- It is recommended to use a minimum of three points of support, taking into account the position of the center of gravity. Always center the load evenly on the cylinder, U-rings and spacers.
- It is recommended to use the fork CRF150 to place and adjust the U-rings and spacers.
- Make sure all cylinders are at the same distance from the load when the lift starts. It is recommended to start with the cylinder in contact with the load to help spread the load evenly when it rests on the U-rings.
- Make sure U-rings seat securely on the cylinder base and ensure the U-rings are stable when stacked.
- Side load capacity is limited to 5% on the complete set. If an additional U-ring and spacer is used, side load capacity is reduced to 3%.
- In case of an identified side load, position the open end of the U-rings towards the direction the side load is coming from and try to lift the load the minimum possible to allow the insertion of the U-ring.

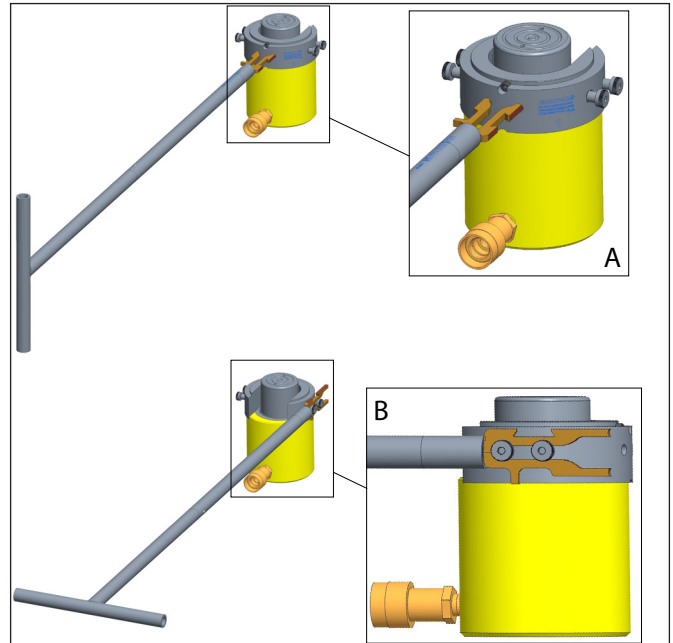
4.2 Lifting the Load

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

1. Extend the cylinder to 95% of the total stroke.
2. Insert the bottom U-ring (light color) beneath the load using the fork.

- The U-ring can be inserted using the rear holes (A) or the side screws (B).



3. Adjust the U-ring position using the fork:
 - Place the U-ring so it is properly seated and aligned.
 - Orient the U-ring with the opening facing outward to allow the spacer to be inserted.

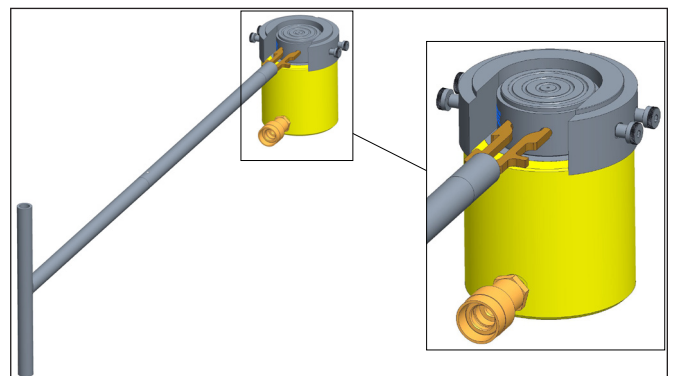
⚠ WARNING

Make sure the U-rings are properly seated and aligned before retracting the cylinder.

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

4. Retract the cylinder completely allowing the load to rest on the U-ring.
5. Place the bottom spacer (light color) on top of the plunger using the fork.



6. Adjust the spacer to be properly seated and aligned.

⚠ WARNING

Make sure the spacers are properly seated and aligned before extending the cylinder.

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

7. Extend the cylinder until the load rests on the spacer.
8. Extend the cylinder to 95% of the total stroke.
9. Insert a top U-ring (dark color) on top of the already installed U-Ring using the fork.
10. Adjust the U-ring position using the fork:
 - Place the U-ring so it is properly seated and aligned.
 - Orient the U-ring with the opening facing outward to allow the spacer to be inserted.

⚠ WARNING

Make sure the U-rings are properly seated and aligned before retracting the cylinder.

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

11. Retract the cylinder completely allowing the load to rest on the U-ring.
12. Place a top spacer (dark color) on top of the already installed spacer using the fork.
13. Adjust the spacer to be properly seated and aligned.

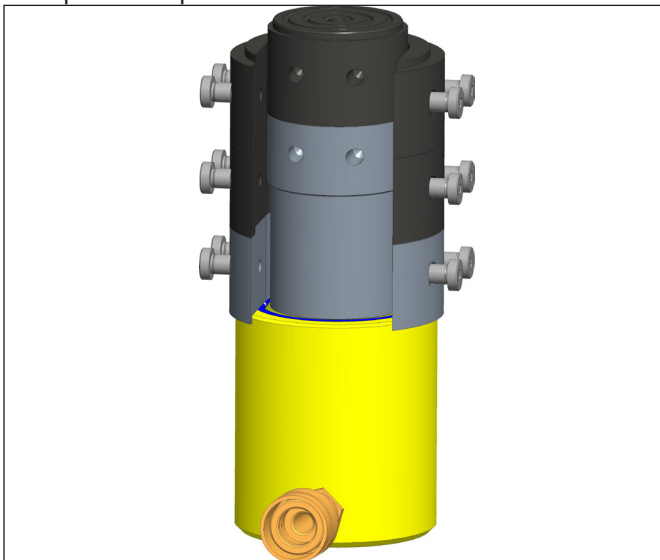
⚠ WARNING

Make sure the spacers are properly seated and aligned before extending the cylinder.

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

14. Repeat steps 8 to 13 until all the top U-rings are placed in position.



NOTICE

CR30S and CR50S include 3 U-rings (bottom and 2 tops) and 2 spacers (bottom and top). CR100S includes 4 U-rings (bottom and 3 tops) and 3 spacers (bottom and 2 tops). If using additional elements, 1 U-Ring and Spacer can be added on the 30 and 50 ton models, and up to 2 U-Rings and spacers on the 100 ton model.

4.3 Holding the Load

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

1. Retract the cylinder completely allowing the load to rest on the U-rings.

4.4 Lowering the Load

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

1. Extend the cylinder until the load rests on the spacers.
2. Remove one U-ring using the fork.

⚠ WARNING

Make sure the U-rings are properly seated and aligned before retracting the cylinder.

⚠ WARNING

To prevent serious personal injury, keep hands, fingers and other body parts clear of working area during cylinder operation.

3. Retract the cylinder completely allowing the load to rest on the U-rings.
4. Remove one spacer using the positioning fork.
5. Repeat steps 1 to 5 until all U-rings are removed.

NOTICE

CR30S and CR50S include 3 U-rings (bottom and 2 tops) and 2 spacers (bottom and top). CR100S includes 4 U-rings (bottom and 3 tops) and 3 spacers (bottom and 2 tops). If using additional elements, add 1 U-ring and 1 spacer for set.

5. Inspection, maintenance & storage

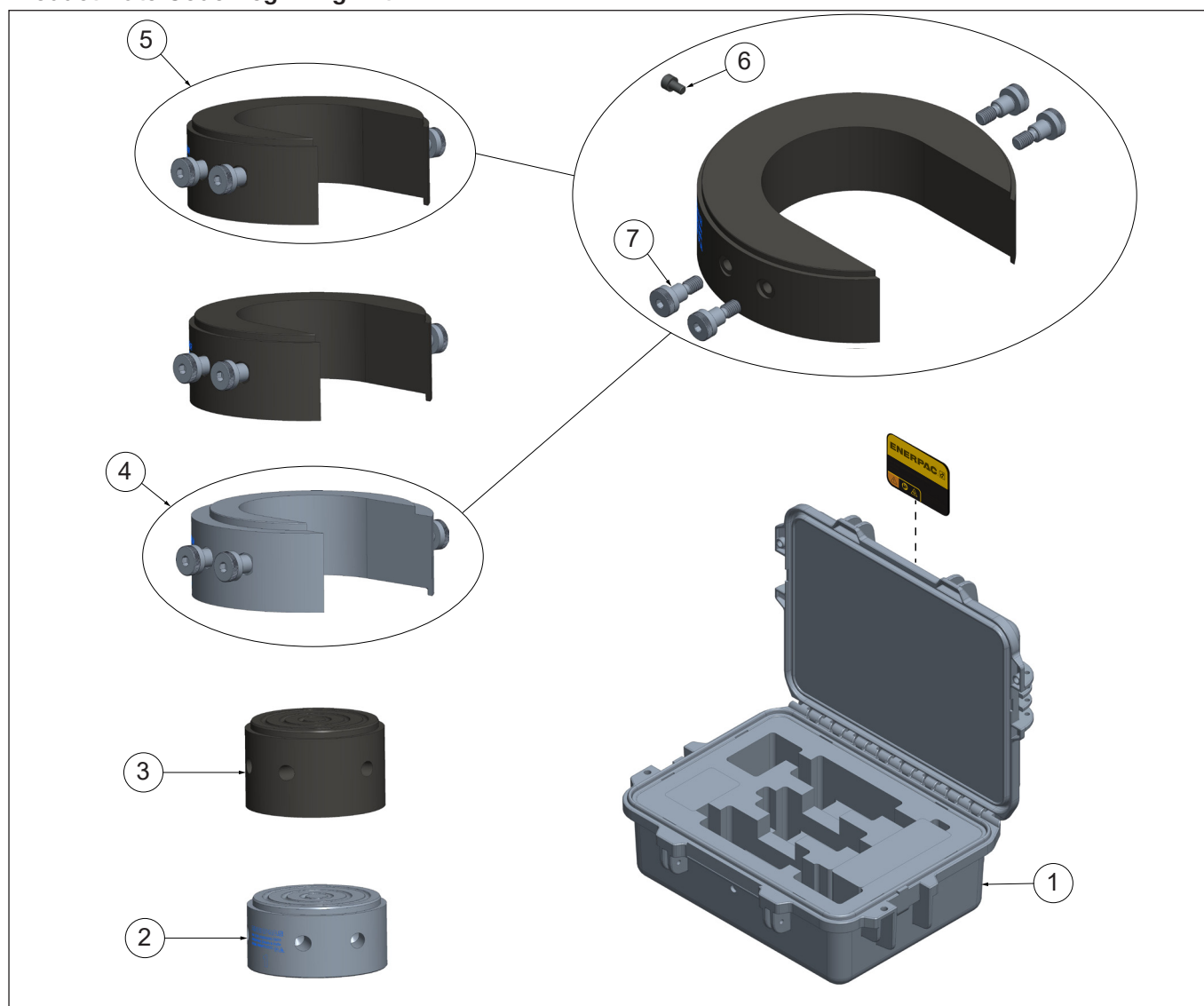
- Periodically check the components looking for cracks, corrosion, deformation and other mishaps. Replace any damaged components.
- Store components in a clean, dry and secure location.
- If spares are required, refer to Section 6 - Parts List to find the applicable reference.

NOTICE

Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Center in your area.

6. Parts List

Product Date Code Beginning With: A



Item	Description	CR30S		CR50S		CR100S	
		Part Number	Qty	Part Number	Qty	Part Number	Qty
1	Flight Case (including decal and foams)	-	1	-	1	-	1
2	Bottom Spacer ♦	CR30P1	1	CR50P1	1	CR100P1	1
3	Top Spacer ♦	CR30P2	1	CR50P2	1	CR100P2	2
4	Bottom U-Ring Assembly ♦	CR30U1	1	CR50U1	1	CR100U1	1
5	Top U-Ring Assembly ♦	CR30U2	2	CR50U2	2	CR100U2	3
6	Back Screw M5x8 *	-	1	-	1	-	1
7	Side Screw M8x10 *	-	4	-	4	-	4

♦ Available as repair part or additional item.

* Parts included in each U-Ring assembly

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