Vertical Lifting Clamp

(Lock Handle type with Universal shackle)

SVC-E

Operation Manual

This operation manual explains the basic operation and handling of the clamps. Please read this manual carefully before use and observe the precautions for safe operation.

SUPER TOOL CO., LTD.

SUPER brand lifting clamps are energy-saving lifting equipment which have been developed for the purpose of transporting steel materials.

Proper use

Operate lifting clamps after carefully reading and understanding this instruction manual for enhancing efficiency and safety of operation.

Prime efficiency and economy

Advanced functions, reasonableness and versatile applications of finely and carefully designed SUPER lifting clamps ensure prime efficiency and economy.

Special considerations on safety

We conduct a pulling test with a load three times (or twice) of rated capacity and a manufacturing serial number is marked on each product, thus directing a special attention to safety.

Precautions for safety operation

(Pages 1～10 are comon to all lifting clamp models)

Be sure to read this instruction manual carefully before use.

Mistaken use of lifting clamp may cause a danger such as dropping of load.

Education of “crane safety regulations,” “operation manual for lifting clamp,” “your company’s operation standards,” etc. should be given before actual operation not only to business owners who have purchased clamps but also to their operators to ensure that actual operators have acquired enough knowledge, safety information, and precautions of the clamps.

Safety precautions are divided into two classifications in this manual; “Warning” and “Caution,”.

WARNING:	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION:	Indicates a potentially hazardous situation which, if not avoided, could result in medium damage or slight injury, or could result in property damage.

While only mentioned in ⚠CAUTION, failure to comply with them still may lead to a serious disaster. As such, do not fail to pay attention both to WARNING and CAUTION which are of great importance.

Meanings of Signs

The signs of ◇! and ⚠ indicate that precautions should be taken.
The contents of warning or caution are described at each sign.

The sign of ⊘ indicates prohibited actions.

The sign of ● indicates that an action is enforced or instructed.

Two point lift for  righthand figure.

※ After reading this manual, make sure to keep it at a place of easy access by any users.

1. Handling in general

WARNING	
● Do not operate until the contents of the operation manual, and caution tag/plate are thoroughly read and understood. ● Do not operate without a legal qualification. ● Be sure to clear of the area of the operation for lifting or turning a load against possible drop off or fall over. ● Do not use for other than intended purpose.	 Prohibited
● Make sure to execute an inspection periodically and before each operation.	 Instructed

2. Check before operation

WARNING	
● Do not use clamp unsuitable for the operation method. ● Do not use clamp of an abnormal condition; deformed, cracked, worn, malfunctioning, etc. ● If the load is under the following conditions, do not use clamp. (A material of fragile, high-hardness, low-hardness or extremely low-hardness, or a member with the gripping part tapered down more than 8°)	 Prohibited
● Check the type, rated capacity, clamp range, and “periodic inspection completed” label displayed on clamp body. ● The load to be lifted shall be within an allowable range of rated capacity of clamp. ● Thickness of load shall be within designated clamping range.	 Instructed
CAUTION	
● Do not use clamp for the load under the following conditions. (Load to be lifted is more than 150℃, or in an atmosphere or solution of acid or alkaline chemicals less than minus 20℃)	 Prohibited
● Sling to be used for the clamp shall be an appropriate one for lifting operation.	 Instructed

3. Lifting operation

WARNING	
● Do not use clamp, lifting at one point. (excluding special or custom ordered products) ● Do not use the clamp in the following ways of lifting: lifting of two or more individual objects at one time. (overlapped loads, padded load etc. , or side gripping) ● Do not use the clamp for pulling out steel plate sheet from the steel sheet pile or for vertical lifting of the sheet. ● Do not use the clamp when strong wind may threaten to cause any danger. ● Do not use the clamp for a hydraulic shovel.	 Prohibited
● Install two or more clamps in a balanced way to keep the balance of load.	 Two point lift
● The lifting angle of the clamps and the dividing angle should be kept within the allowable angles according to types. Load should be inserted to the innermost end of the jaw opening. ● When you use the clamp with a lock mechanism, never fail to have the lock engaged.	 Instructed
CAUTION	
● If oil, paint, scale, rust, etc. are on the gripping pad, do not use the clamp. ● Do not drop clamp or drag on the ground.	 Prohibited

4. Operation of a crane

WARNING	
● Never lift a load exceeding the rated capacity. ● Do not operate a crane in such a way as to give an impact to the load or the clamp. ● Do not allow a person to stand on the load or to carry him. ● Do not lift a load which is not free from any other objects. ● Do not release the lock of clamp while lifting load. ● Avoid unintended contact by load to an adjacent member or to the clamp, which has been removed from the load.	 Prohibited

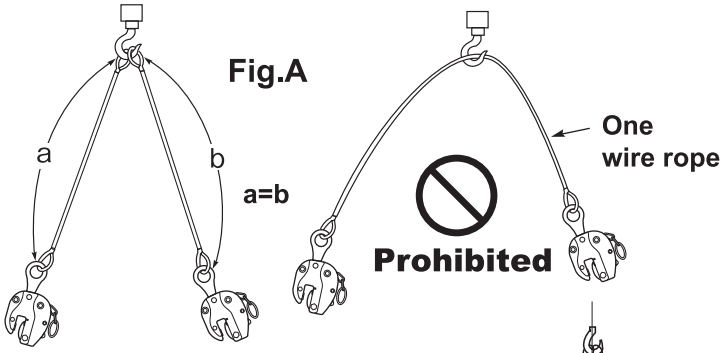
● Stop the lifting operation by crane for a moment when the load is applied to the lifting ring for safety checking. (depth of the load into the clamp opening; status of locking). ● Stop the operation of the crane just before the load reaches the ground, and check the following matters: (Inclination or falling over of the load and security around the landing area of the load)	 Instructed
⚠ CAUTION	
● Do not operate the crane in such a way as to drag the load along the ground. ● Do not leave the crane (or winder, etc.) unattended from an operating position while keeping the load lifted with the clamp.	 Prohibited
● Raising and lowering operation by crane should be done slowly and carefully.	 Instructed

5. Maintenance, storage and alteration

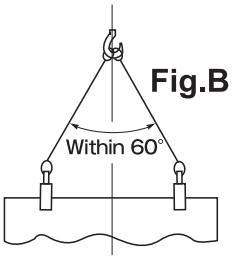
⚠ WARNING	
● Never alter the clamp and its accessories. ● Do not apply welding or heat to the clamp or its accessories. ● Do not use any other parts than our company's genuine parts. ● Clamps which require the repair should be stored at a different place so that they are not used mistakenly.	 Prohibited
● Persons with specialized knowledge designated by the business owner are to conduct maintenance and repairing work. ● When any abnormality with the clamp is found, do not use it and immediately repair or dispose. ● Remove, if any, paint or mud sticking to the moving parts of the clamp, cams, and pads.	 Instructed
⚠ CAUTION	
● Conduct maintenance and repairing without any load attached. ● Conduct maintenance and repairing after posting a sign indicating that you're on the maintenance work. ● Never fail to lubricate oil on the rotating parts of the clamp (around the pins), guide grooves, sliding parts, etc. ● Be sure to store clamps indoor.	 Instructed

■ General warning for use (common to all lifting clamp models)

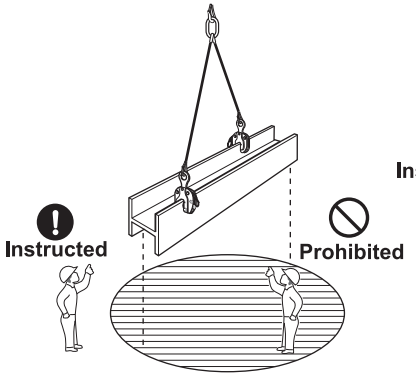
1. **Be sure to select proper model clamps for use.**
   Pay special attentions to keep the lifting direction (rope angle).
2. Confirm the weight of the load. Do not exceed maximum capacity (designated ton) on clamps. (Never overload.)
3. Before use, confirm followings:
   (a) Proper capacity of clamps.
   (b) No abnormal movements of clamp or loosening of any bolts.
   (c) No oil or other foreign matters on the surface of the cam and pad.
4. **Never use for load beyond the clamp range.**
5. When installing clamps, insert a lifting load completely until it comes in contact with the deepest of the jaw opening of main body.
6. **Depending on the model or capacity of the clamp, the cam teeth may not bite a load sufficiently when the load is a hard or light weight material (Less than 1/5 of maximum capacity or less than 1/4 of maximum clamp range). Confirm the condition of clamp for safety.**
7. Confirm that the safety lock is completely engaged in case clamp has a built-in lock.
8. Confirm that the load is well balanced. Determine the clamp position or the center of gravity of the rope properly. It is especially important to determine the horizontal center of gravity.
9. When lifting at 2 points, be sure to use two wire ropes, and make them equal length. (Fig. A)



10. When lifting at 2 points, keep the lifting angle within 60°. (Fig. B)
    (Follow the standards if lifting angle is specified depending on items.) If the load is long, use a balance.



11. Never lift two or more steel plates or steel members at a time.
12. The load may move to an unexpected direction when lifted off the ground and as such confirm the center of gravity and the clamping position for safety when raising. Sufficient caution should be taken until the clamp with the load becomes completely balanced.
13. When changing directions of the load or any similar operations, all personnel must be clear of the area of operation. (Fig. C)



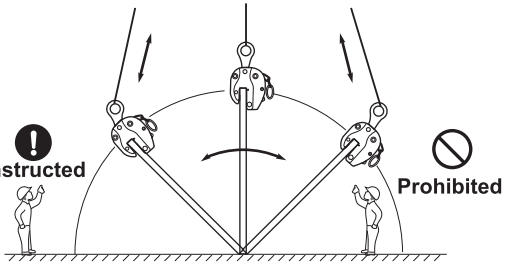


Fig.C

14. Do not ride on the lifting load.
    Never use clamp for riding or carrying person.
15. Keep momentary inverting angle of a steel plate within 30°. (Fig. D)

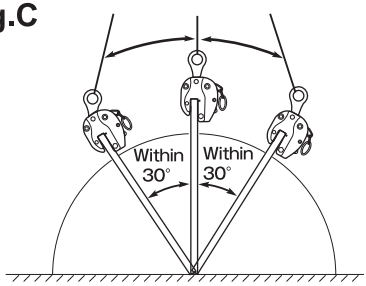


Fig.D

16. **Before operation, the surface of load must always be clean and free of scale, coatings or other foreign matters that will reduce clamping force significantly.**
17. **When raising, special attention must be given to prevent the rope from loosening by its unintended contact with any other objects.**
18. When raising again after the load is put on ground, reconfirm the clamp condition.
19. Do not use clamp for heated load or in a corrosion liquid because safety factor and durability will be reduced in such conditions.
20. Do not alter clamp by welding, cutting by gas or by any other modification.
21. Do not weld electrically a load while being lifted by clamp.
22. Conduct daily maintenance and lubrication.

■ Maintenance and Inspection

1. Maintenance

Daily maintenance is important for efficient and safe operation even under the severe use condition and for such purposes, please comply with the followings.

(1) Designate the use standards and control.

(2) Keep clamps indoor and do not leave them outdoor.

(3) Check the followings to maintain in a good condition.

  (a) Operating condition.

  (b) Any abrasion, damage, or clogging at teeth of cam and pad.

  (c) Deformation of main body - at jaw opening in particular.

(4) Separate conforming clamps and other hazardous items identified during use or inspection and designate the defective sections. Perform maintenance any soon.

(5) For the storage, place soft material as wooden chip in-between cam and pad to protect the teeth.

(6) Perform inspection and maintenance once a week by referring to “Inspection Standards”. Lubricate sliding sections periodically. (However, remove oil at teeth of cam and pad.)

2. Periodic Inspection

Perform periodic inspection in accordance with the periodic inspection and maintenance standards. Functions and life of clamps may differ in a great degree as they are used in varieties of fields under different conditions of use. Therefore, preparation and practice of effective handling/inspection standards manual by users themselves are recommended. We ask you to establish complete maintenance and control for assurance of safety in reference to our Manufacturer’s Inspection Standards of our clamp. Clamp is designed for easy replacement of parts and therefore, do not fail to replace defective parts. Also, keeping spare parts at all times is recommended. For your preparation of the standards, pay special attention to the followings.

(1) Operation and maintenance standards

  (a) Preparation of use criteria (shape of load and operating methods).

  (b) Thorough understanding and compliance of cautions on handling.

  (c) Maintenance and storage.

  (d) Rules of inspection and check at site.

(2) Standards on periodic inspection
(A) Establishing dates of periodic inspection.
(B) Establishing inspection and maintenance methods.
(a) Inspecting period.
(b) Person in charge of the inspection.
(c) Inspection site.
(d) Tools and devices for inspection.
(e) Establishment of permissible limit of use.
(f) Explicit designation of maintenance and repair methods.

3. Manufacturer's inspection method

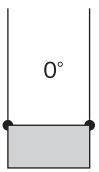
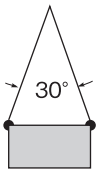
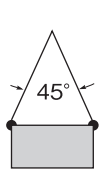
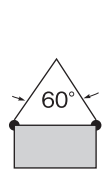
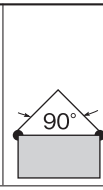
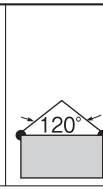
Our company's inspection procedures are as follow.

Check for
(1) Movements.
(2) Wear, loss, and/or clogging of/at the teeth of the cam and screw.
(3) Deformation of main body.
(4) Deformation of shackle.
(5) The status of bolts, pins, links and springs.
(6) Deep scratches in general.
(7) Other checking items based on the Standards.

LIFTING ANGLE AND SAFE LOAD OF WIRE ROPE

The maximum allowable load (safe load) of wire rope also varies with the lifting angle. Therefore, select a wire rope of proper diameter in consideration of the lifting angle.
(The breakage load specified in table below refers to No.4. 6×24A class of JIS G3525.)

Correlation between Lifting Angle and Safe Load of Wire Rope (in two-point lifting)

D Wire rope dia (mm)	σ Break-age load (tons)	W Safe load (on one rope) W=σ/S (safety factor S=6) (tons)	 0°	 30°	 45°	 60°	 90°	 120°
			(Changes in lifting efficiency due to lifting angle.%)					
			100%	96%	92%	86%	70%	50%
			Max.allowable load (safe load) on two wire ropes (tons)					
8	3.21	0.54	1.08	1.04	0.99	0.93	0.76	0.54
9	4.06	0.68	1.36	1.31	1.25	1.17	0.95	0.68
10	5.02	0.84	1.68	1.61	1.55	1.44	1.18	0.84
11.2	6.29	1.05	2.1	2.02	1.93	1.81	1.47	1.05
12.5	7.84	1.31	2.62	2.52	2.41	2.25	1.83	1.31
14	9.83	1.64	3.28	3.15	3.02	2.82	2.3	1.64
16	12.8	2.13	4.26	4.09	3.92	3.66	2.98	2.13
18	16.2	2.7	5.4	5.18	4.97	4.64	3.78	2.7
20	20.1	3.35	6.7	6.43	6.16	5.76	4.69	3.35
22.4	25.2	4.2	8.4	8.06	7.73	7.22	5.88	4.2
25	31.3	5.22	10.44	10.02	9.6	8.98	7.31	5.22
28	39.3	6.55	13.1	12.58	12.05	11.27	9.17	6.55
30	45.1	7.52	15.04	14.44	13.84	12.93	10.53	7.52
31.5	49.8	8.3	16.6	15.94	15.27	14.28	11.62	8.3
33.5	56.3	9.38	18.76	18.01	17.26	16.13	13.13	9.38
35.5	63.2	10.53	21.06	20.22	19.38	18.11	14.74	10.53

Note For four-point lifting, multiply the corresponding figure in the table by 2 to find the maximum allowable load (safe load).

Simplified calculation method of wire rope diameter and safe load(one-point lifting)

1) $D=\sqrt{W\times C}$

2) $W=\frac{D^2}{C}$

Where D: wire rope diameter(mm)
W: safe load(tons)
C : constant=120
(safety factor S=6)

★To find the diameter of wire rope for 3 tons:

① $D=\sqrt{W\times C}$

$D=\sqrt{3\times 120}=\sqrt{360}=19\rightarrow 20$mm

★To find the service load (safe load) on 25mm diameter wire rope.

② $W=\frac{D^2}{C}$

$W=\frac{25^2}{120}=\frac{625}{120}=5.2\rightarrow 5.2$ton

Vertical Lifting Clamp

(Lock Handle type with Universal shackle)

SVC-E

Operation Manual and Inspection Standards

Vertical Lifting Clamp

(Lock Handle type with Universal shackle)

SVC-E

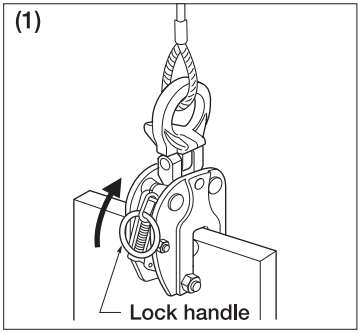
Lower clamp onto plate (object to be lifted) with spring tension off.
Be sure that end of plate is sufficiently deeper than red mark on the mouth part of body.
When lifting from horizontal, place short leg under plate.

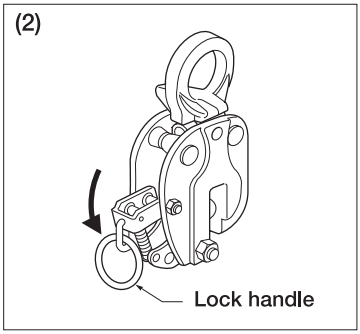
Raise tension arm into upper position (Lift) as shown in (1).

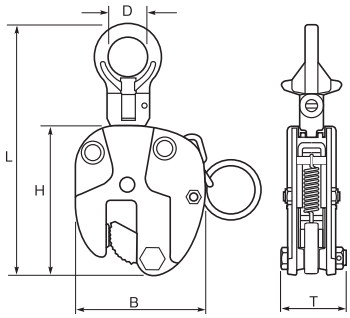
When detaching plate, spring tension off as shown in (2) after loosed the wire rope.
When detaching plate horizontally, place short leg down not to damage lock device part.

Warning : Do not reverse spring tension untill plate is at rest.

4. Do not lift steel plate in the state of 1 and 3.



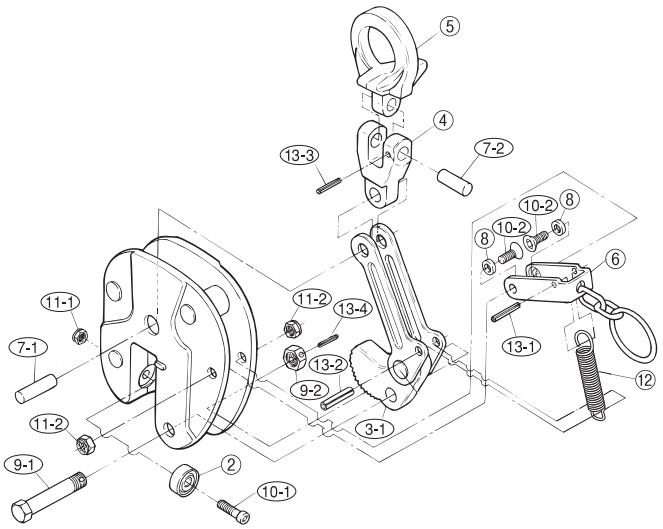




(Unit : mm)

ITEM No.	Capacity (tons)	Clamping range	D	L	H	B	T	Weight (kg)
SVC0.3E	0.3	0~16	26	157~176	110	100	49	1.5
SVC0.5E	0.5	0~19	30	180~204	125	110	54.5	2.1
SVC1E	1	0~25	35	223~257	160	130	65	3.7
SVC1.5E	1.5	0~28	45	254~290	174	150	74	5.5
SVC2E	2	0~32	55	292~335	194	162	76	7.0

Replacement parts and fittings (Model:SVC-E)



Part No.	Part Name	Item No.
SHACKLE ASSEMBLY		SVH
4	Connector	SVCJ
5	Shackle	SVCH
7-1	Connecting pin(Long)	SVCY
7-2	Connecting pin(Short)	SVCX
13-3	Spring pin	SVCR
CAM ASSEMBLY		SVT
3-1	Cam・Link	SVCT
13-2	Spring pin	SVCU
CAM SUPPORT PIN ASSEMBLY		SVK
9-1	Support bolt for cam	SVCK
9-2	Support nut for cam	
13-4	Spring pin	SVCO
PAD ASSEMBLY		SVP
2	Pad	SVCP
10-1	Hex.socket head cap screw	SVCV
11-1	Nylon nut	
HANDLE ASSEMBLY		SVG
6	U-handle	SVCG
10-2	Hex. socket flat head bolt	SVCF
11-2	U-nut	
8	Collar	SVCZ
13-1	Spring pin	SVCQ
12	Spring	SVCS

Replacement procedure for cam and pad

Disassembling

A） PAD（2）

1. Take out by loosening Cap screw (10-1) and Nut (11-1).

B） CAM（3-1）

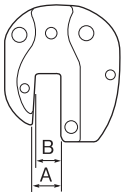
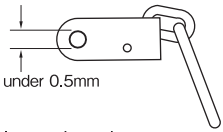
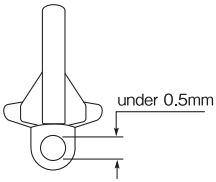
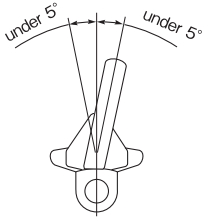
1. Pull out Spring pin (13-4) for Bolt (9-1) and Nut (9-2) .
2. Take out Bolt (9-1) and Nut (9-2). Be sure Spring ⑫ is not tensed before taking out.
3. Detach Shackle ⑤ by pulling out Connecting pin (7-2) after taking out Sprjng pin (13-3) for Connector ④.
4. Push down Connector ④ and push out Connector pin (7-1) with pin-punch or likes through small hole in the back-side of body after bringing Connecting pin (7-1) into line with hole of Main body.
5. Take out Connector ④ and Cam (3-1). Pull out Spring pin (13-2) in Cam (3-1) side in order to take out Spring ⑫.

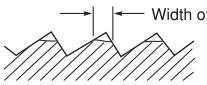
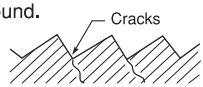
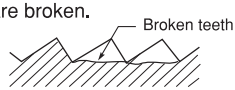
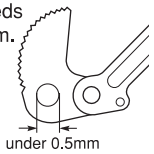
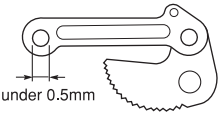
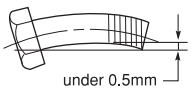
Reassembling

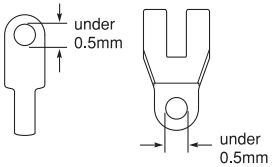
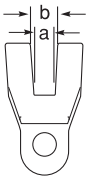
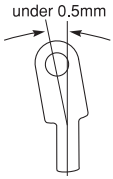
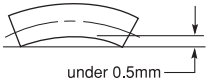
A） PAD and （B）CAM

Assemble Pad ② and Cam (3-1) with counter order of disassembly.

Standards for checking clamps (Model;SVC-E)

SECTION	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Body	Visually check or use color dyes to find cracks.	Dispose of the clamp when a crack is found.	∗Overloading ∗Dynamic loads
	Measure the jaw openig.	Dispose of the clamp when the difference of “A”and “B” exceeds 5%.	∗Overloading ∗Too large hoisting angle
	Visually check and measure each section for other forms of deformation.		∗Overloading ∗Too large hoisting angle
U-handle	Measure the bolt hole for wear and deformation.	Replace when the wear and the deformation exceed 0.5mm. 	∗Fatigue caused by re-peated use ∗Too large hoisting angle
	Visually check or measure other sections for deformation.	Replace when the movement is not smooth.	∗Overloading ∗Too large hoisting angle
Shackle	Visually check or use color dyes to locate cracks.	Replace when cracks are found.	∗Overloading ∗Dynamic loads ∗Too large hoisting angle
	Visually check and measure the pin hole for wear and deforma-tions.	Replace when the deformation exceeds 0.5mm. 	∗Natural wear from use ∗Insufficient lubrication ∗Overloading
	Visually check and measure for bends or other forms of defor-mations.	Replace when deformation or play exceeds 5 degrees from the center or the clamp. 	∗Overloading ∗Dynamic loads ∗Too large hoisting angle

SECTION	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Cam and Pad	Visually check and measure the amount of wear.	 Capacity / Permissible limit of width of wear: 0.3T, 0.5T, 1T, 1.5T, 2T — under 0.5mm	＊Natural wear from use ＊Wear from clamping hardened material
	Visually check or use color dyes to locate cracks at the base of the teeth.	Replace when the cracks are found. 	＊Overloading ＊Dynamic loads ＊Damage from clamping hardened material
	Visually check for broken pad teeth.	Replace when 1 tooth or more are broken. 	＊Overloading ＊Dynamic loads ＊Damage from clamping hardened material
	Measure the pin hole and check for wear and deformation.	Replace when the deformation exceeds 0.5mm. 	＊Natural wear from use ＊Insufficient lubrication ＊Overloading
Link	Visually check and measure for bends and other forms of deformation.	Replace when unusual sounds generate or when the movement is not smooth.	＊Overloading ＊Too large hoisting angle
	Measure the pin hole and check for wear and deformation.	Replace when the deformation exceeds 0.5mm. 	＊Natural wear from use ＊Insufficient lubrication ＊Overloading
Cam Support Bolt・Pin	Measure the shaft and check for wear.	Replace when the wear exceeds 0.5mm.	＊Natural wear from use ＊Insufficient lubrication
	Visually check or use color dyes to find cracks.	Replace when the cracks are found.	＊Overloading ＊Dynamic loads ＊Too large hoisting angle
	Visually check and measure for bends and other forms of deformation.	Replace when the deformation exceeds 0.5mm. 	＊Overloading ＊Dynamic loads ＊Too large hoisting angle ＊Fatigue from repeated use

SECTION	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Conector	Visually check or use color dyes to find cracks and flaws.	Replace when cracks are found.	✻Overloading ✻Dynamic loads ✻Too large hoisting angle
	Visually check and measure the pin hole for wear.	Replace when the wear and the deformation exceed 0.5mm. 	✻Natural wear from use ✻Insufficient lubrication ✻Overloading
	Visually check and measure for bends.	Replace when the difference of "a" and "b" exceeds 1mm.  Replace when deformation or play exceeds 5 degrees from the center or the clamp. 	✻Overloading ✻Dynamic loads ✻Too large hoisting angle
Connecting Pin (Long / short)	Measure the shaft and check for wear.	Replace when the deformation exceeds 0.5mm.	✻Natural wear from use ✻Insufficient lubrication
	Visually check and measure for bends and other forms of deformation.	Replace when the deformation exceeds 0.5mm. 	✻Overloading ✻Dynamic loads

SECTION	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Springs	Confirm that the spring generates a constant initial load on the cam when the U-handle is in position	Replace when deformation prevents a normal spring force. Also replace when the weight of the shakle and cam causes a clearance over 1mm at the clamping section when the U-handle is in position at clamp dimension 0mm.	*Fatigue caused by repeated use
	Visually check both ends of hook for cracks and deformation.	Replace when extensive wear is found on the inside of the hook sections, or when there is a possibility that the deformation will cause the spring to come loose from the spring pin.	*Fatigue caused by repeated use
	Confirm that the spring is sticked when it is natural length.	Replace when the the length exceeds 5 %.	*Fatigue caused by repeated use
Bolt, collar and nut for U-handle	Measure the bolt and the collar for wear.	Replace when the wear exceeds 0.5mm.	* Fatigue caused by repeated use * Too large hoisting angle
	Visually check and measure for bends.	Replace when the movement is not smooth.	* Fatigue caused by repeated use * Too large hoisting angle
	Visually check the nuts.	Replace when the nuts come off or loosen.	* Fatigue caused by repeated use

■ CAUTION:

- ◆ Use within the rated capacity.
- ◆ Use within the clamp range.
- ◆ Do not use for any objects other than steel materials.
- ◆ Do not use for hard (30 HRC or higher) load.
- ◆ Lifting is not allowed for a load tapering down in upward direction.
- ◆ Do not apply shock to the load or lifting clamp.
- ◆ Do not lift more than one plate.
- ◆ Before using the product, be sure to check for clogging and wear of the teeth of the cam, screw and any other parts.
- ◆ Do not alter. Heating, modifying, etc. will significantly reduce the quality (strength).

■ OTHER:

- ◆ Inquiries for Repair Parts and Repair.
  If repair parts or repairs are required, stop using this clamp and contact your distributor.

■ DAILY INSPECTION:

Conduct daily checks and maintenance to prevent the loss of safety and efficiency.

1. Check that there are no cracks at the body, cam, or wire rope holes.
2. Check if the movement and lubrication condition of each part are good.
3. **Check for wear, loss, or clogging of the teeth of the cam and screw.**
4. Refer to other inspection standards.