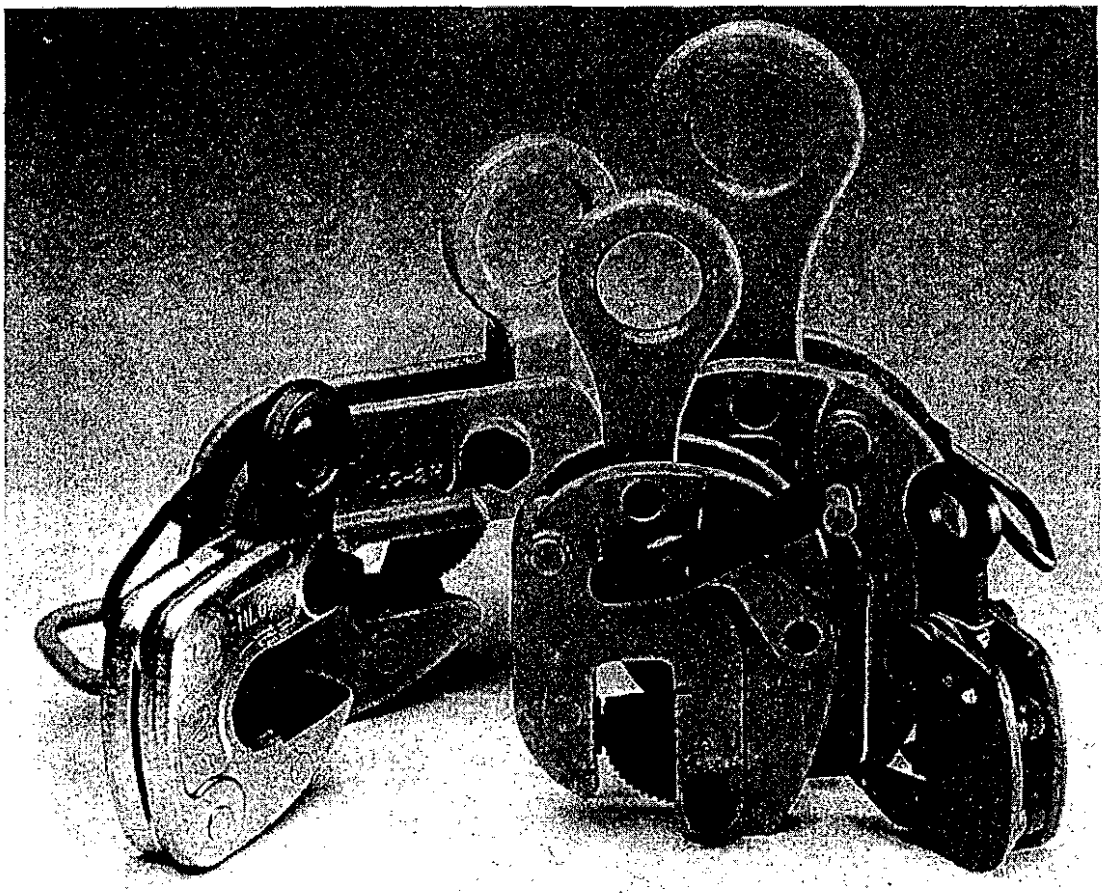
SAFETY LIFTING CLAMPS

SUPER

INSTRUCTION FOR OPERATION OF "SUPER" BRAND LIFTING CLAMPS

DLC-0.5V



SUPER TOOL CO., LTD.

OSAKA, JAPAN

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

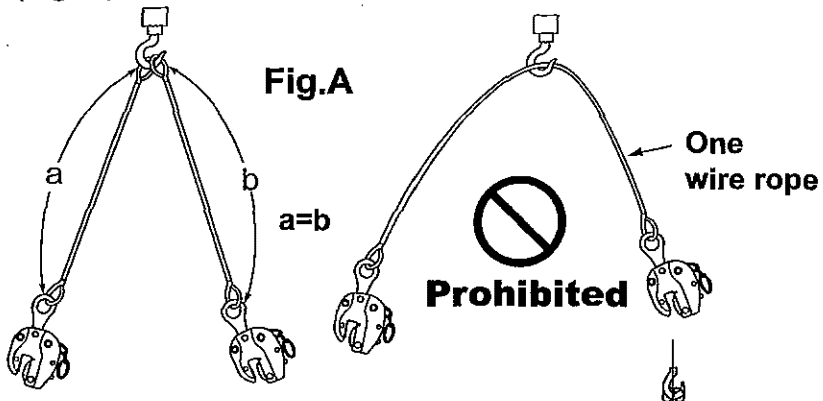
● Stop the lifting operation by crane for a moment when the load is applied to the lifting ring for safety checking. (depth of the load into the clamp opening; status of locking). ● Stop the operation of the crane just before the load reaches the ground, and check the following matters: (Inclination 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

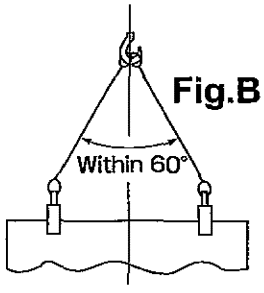
⚠ WARNING	
● Never alter the clamp and its accessories. ● Do not apply welding or heat to the clamp or its accessories. ● Do not use any other parts than our company's genuine parts. ● Clamps which require the repair should be stored at a different place so that they are not used mistakenly.	 Prohibited
● 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)

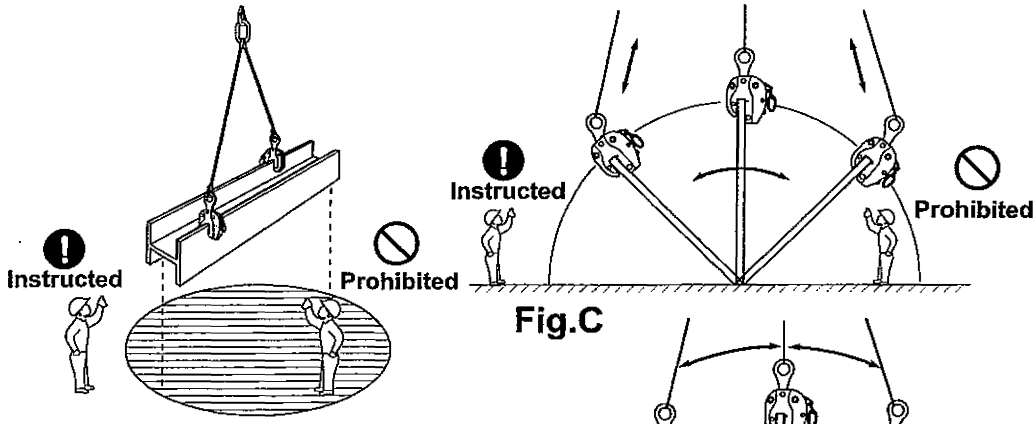


Fig.C

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)

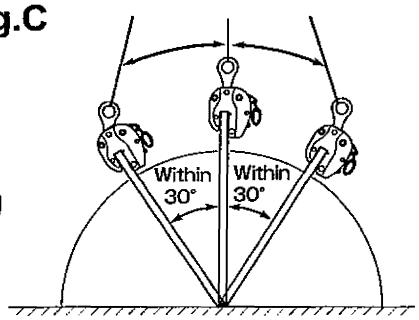


Fig.D

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 Breakage 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 $D=\sqrt{W\times C}$

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

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

② $W=\frac{D^2}{C}$

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

Drum Lift Cramp
(Vertical Lifting)
DLC0.5V

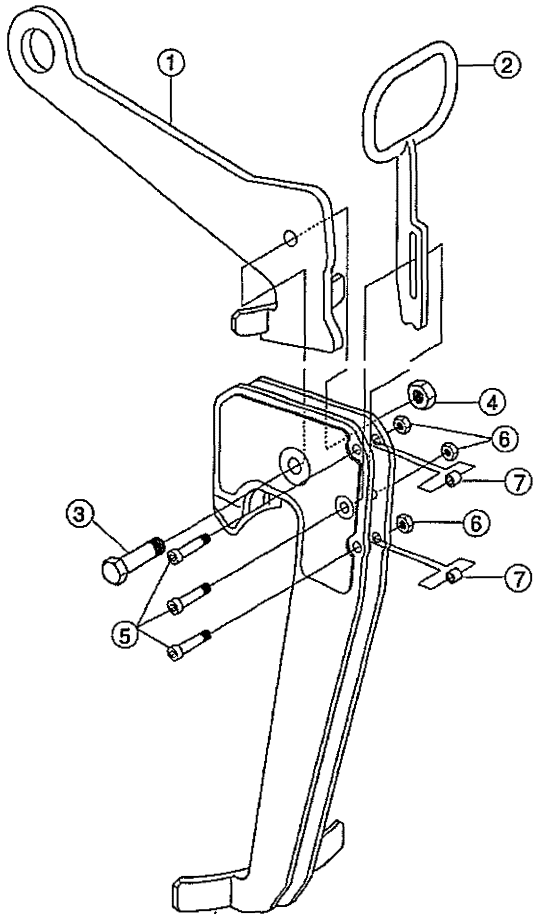
■ Use application

This is the optimal clamp dedicated for lifting drums for industrial use at their carrying and loading.

■ Specifications

Item No.	Rated capacity (ton)	Clamping range (mm)	Weight (kg)
DLC0.5V	0.5	2～3.5	9

■ Parts name



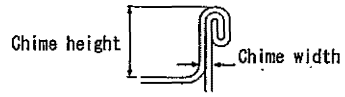
Parts No.	Parts name	Parts code
1	Shackle	DLCH
2	Grip	DLCG
3	Shackle-supporting bolt	DLCS
4	Shackle-supporting nut	
5	Bolt	DLCN
6	Nut	
7	Collar	DLCK

Note 1: At time of ordering parts, add "0.5V" to the end of the parts codes.

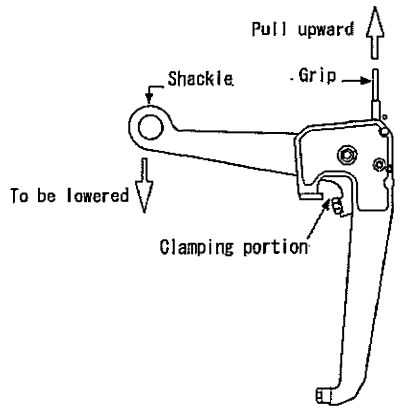
(Ex.: Shackle for DLC0.5V is to be specified as DLCH0.5V.)

■ Handling instructions

1. Applicable types of drums
   (1) Classes H and M of Category 1 of Steel tight-head drum (JIS Z 1601)
   (2) Drum of min. 20kg in weight, with a rid of 600 to 700mm in diameter and with a chime 2 to 3.5mm in width and 22 to 28mm in height.

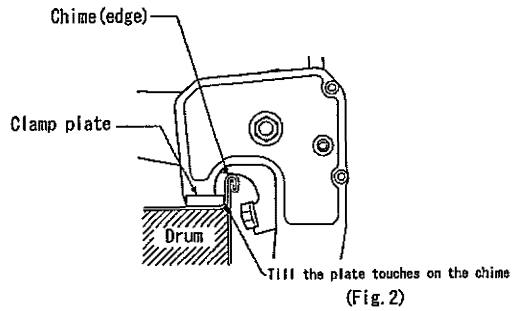


2. Operating instructions
   (1) Pull the grip upward and the clamping portion will open with the unlocked shackle lowered. (See Fig. 1.)



(Fig. 1)

   (2) Lift the Clamp body and put it on the chime of the drum so that the clamp plate touches on the chime portion. (Fig. 2)

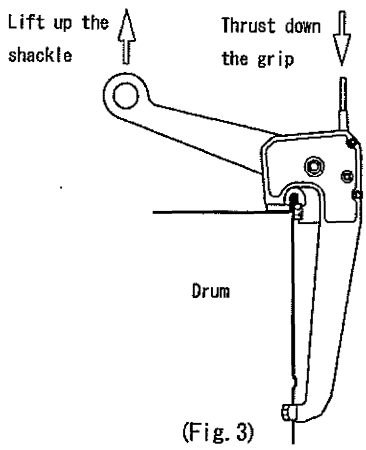


(Fig. 2)

(3) Lift up the end of the shackle all the way to the very end and fully thrust down the grip. In this case, the grip may automatically go down due to its own weight. However, thrust it down all the way to the very bottom again for locking. (Fig.3)

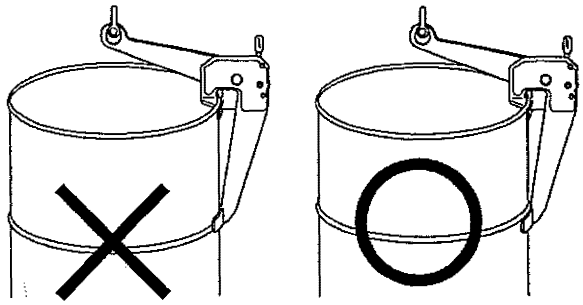
Cautions:

- If the chime is out of the range of use in width and height, the Clamp may not be locked. Don't use the Clamp if it may not be locked.
- If the chime is 2mm or less in width, it may not bear the load, so that don't lift up such a drum with the Clamp.
- If a drum, which meets conditions for application, is rusted or corroded, don't lift it up, since there is a fear of its wearing thin and being unable to bear a load.
- Don't lift up the drum of which the chime is deformed.



(Fig. 3)

- Remove, if there is oil, paint, scale or other extraneous matter from the surface of the chime.
- If the drum weighs 20kg or less, don't lift it up with the Clamp, because it is dangerous, being in an unloaded condition due to its pitching and rolling.
- If the fitting bar of the Clamp unit collides with the orbicular zone of the drum, don't apply the Clamp to the drum. (Fig.4)

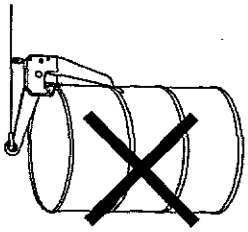

(Fig. 4)

(4)After confirming that the Clamp does not open, being securely locked, lift up the drum slowly and vertically without giving an impact to it. (only for the drum 600mm in diameter)

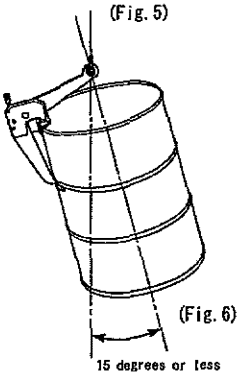
Cautions:

● As the structure of the Clamp does not allow for pulling up or down the drum, never do that kind of thing. (Fig. 5)

● Use the Clamp within a lifting angle of 15 degrees or less, judging from the structure of the Clamp. Take special care about drums especially of a diameter other than 600mm and drums of lighter weight, since they tend to be un-balanced. (Fig. 6)



(Fig. 5)

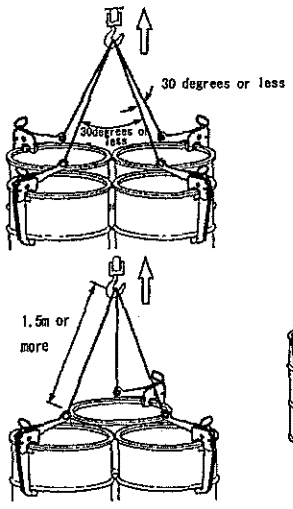


(Fig. 6)

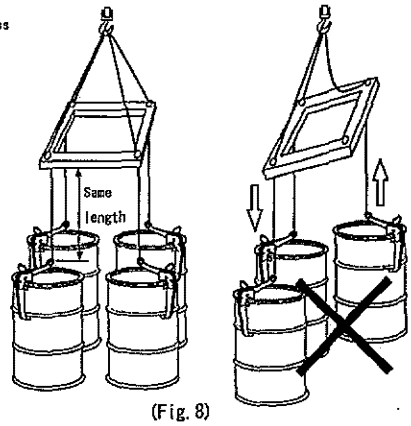
● In case of lifting up a number of drums at one time without using a balancer, the lifting angle shall be within 30 degrees. And the length of slings shall be the same and 1.5m or more. (Fig. 7)

● In case of lifting up a number of drums at one time, using a balancer, the number of drums shall be even and the length of slings shall be the same. (Fig. 8)

● In case of lifting up a number of drums at one time, using a balancer, if the drums are too different in specification or in weight, don't apply this Clamp to them, since they tend to be unbalanced.

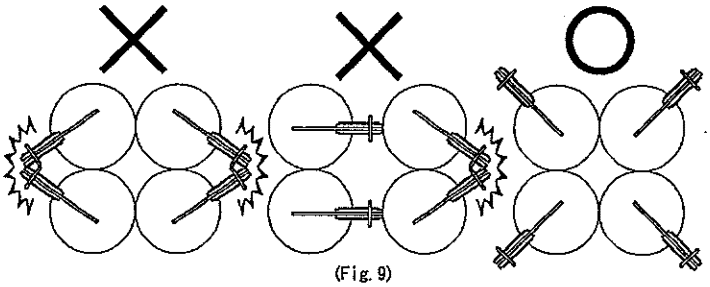


(Fig. 7)



(Fig. 8)

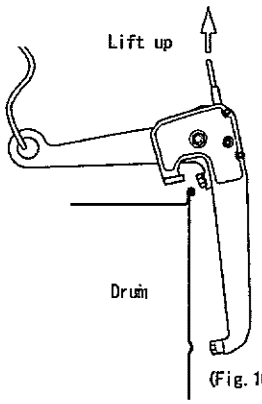
- In case of lifting a number of drums at one time, set clamps at spots where they are not caught between drums and they don't collide with each other. (Fig. 9)
- Lift the drums in such a way as not to cause impacts on the drums and the clamp bodies.



(Fig. 9)

(5) After lifting drums, slowly carry them to a destination, not swinging them and giving them impacts.

(6) When removing the Clamp, lift up the grip part after the wire rope and the chain are loosened. Unlocked status of the Clamp makes it easy for it to be removed. (Fig. 10)



(Fig. 10)

3. Method of disassembling/assembling parts

(1) Method of disassembly

i. Loosen the nuts (at three spots) of the Clamp unit and remove the bolts (3 pcs.) from it.

ii. Remove the grip and the collar (at two spots).

iii. Loosen the shackle-supporting nuts and remove the shackle supporting bolts.

iv. Remove the shackle from the Clamp unit.

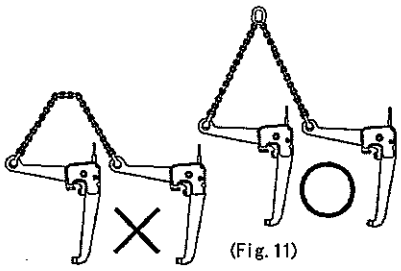
(2) Method of assembly

Assemble the Clamp unit in the reversed order of disassembly.

Note: Don't be mistaken about the position of the grip.

⚠ Cautions:

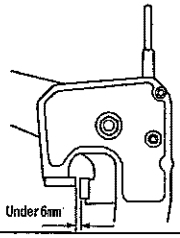
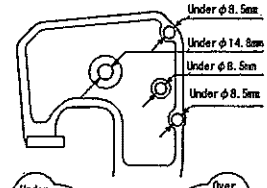
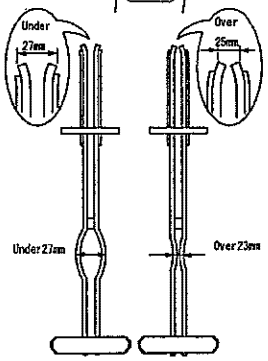
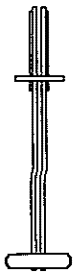
- Use the Clamp within its allowable load
- Don't use this Clamp for others than drums.
- Don't unlock the clamping during lifting operation.
- Don't enter into a dangerous zone, since the lifted drum may move in an unintended direction.
- Don't drag a drum with it clamped by the Clamp.
- Don't put a chain sling or wire rope through the lifting ring for lifting operation.
  The edge of the lifting ring may damage the chain sling or the wire rope.
- When you use a number of clamps for lifting, don't attach a number of clamps to a single chain sling or wire rope. (Fig. 11)

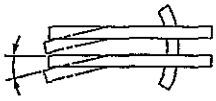
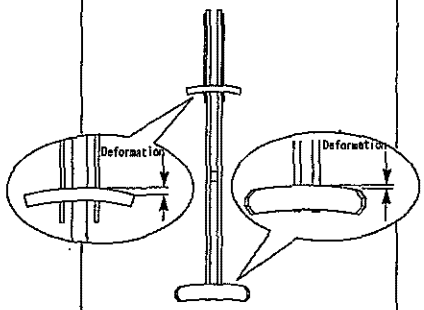
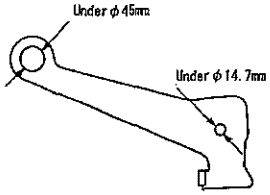
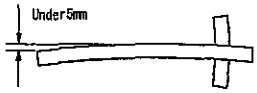
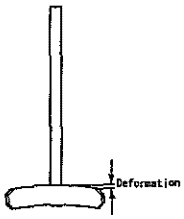


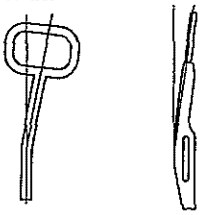
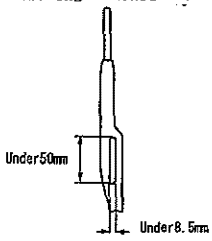
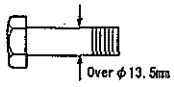
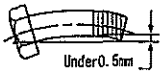
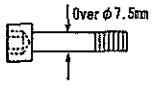
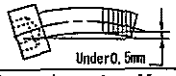
(Fig. 11)

- Don't remodel the Clamp unit. Heating or processing may significant degrade the quality (strength).

Standards for checking clamps (Model ; DLC-0.5V)

CATEGORY	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Function	Measure the jaw opening.	Dispose of the clamp when the maximum dimension in locking status exceeds 6mm. 	*Wear and deformation
Body	Visually check or use color dyes to locate cracks and flaws.	Dispose of the clamp when visually found.	*Overloading *Dynamic loads
	Visually check and measure the holes for wear and deformation.		*Overloading *Dynamic loads *Wear caused by repeated use *Insufficient lubrication
	Visually check and measure for deformation.		*Overloading *Dynamic loads *Too large hoisting angle
		Dispose of the clamp when the distortion is found. 	*Overloading *Dynamic loads *Too large hoisting angle

CATEGORY	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Body	Visually check and measure for deformation.	Dispose of the clamp when the bends are found. 	*Overloading *Dynamic loads *Too large hoisting angle
		Dispose of the clamp when the deformation is found. 	*Overloading *Dynamic loads *Too large hoisting angle
Shackle	Visually check and measure the hole for wear and deformation.	Replace when the hole dia. exceeds ϕ 45mm or ϕ 14.7mm. 	*Overloading *Dynamic loads *Wear caused by repeated use *Insufficient lubrication
	Visually check and measure for bends and deformation.	Replace when the bends exceeds 5mm. 	*Overloading *Dynamic loads *Too large hoisting angle
		Replace when the deformation is found. 	

CATEGORY	INSPECTING METHOD	PERMISSIBLE LIMIT	CAUSES OF THE TROUBLE
Grip	Visually check and measure for bends and deformation.	Replace when the deformation is found. 	*Dynamic loads *Too large hoisting angle
	Visually check and measure the long hole for wear and deformation.	Replace when the hole exceeds the following dimensions. 	*Wear caused by repeated use *Insufficient lubrication
Shackle Support Bolt	Visually check and measure the bolt for wear.	Replace when the bolt dia. becomes less than 13.5mm. 	*Wear caused by repeated use *Insufficient lubrication
	Visually check or use color dyes to locate cracks and flaws.	Replace when visually found.	*Overloading *Dynamic loads *Too large hoisting angle
	Visually check and measure for bends and deformation.	Replace when the bends and the deformation exceed 0.5mm. 	*Overloading *Dynamic loads *Too large hoisting angle *Fatigue caused by long use
Bolt	Visually check and measure the bolt for wear.	Replace when the bolt dia. becomes less than 7.5mm 	*Wear caused by repeated use *Insufficient lubrication
	Visually check or use color dyes to locate cracks and flaws.	Replace when visually found.	*Overloading *Dynamic loads *Too large hoisting angle
	Visually check and measure for bends and deformation.	Replace when the bends exceed 0.5mm. 	*Overloading *Dynamic loads *Too large hoisting angle *Fatigue caused by long use
Collar	Visually check or use color dyes to locate cracks and flaws.	Replace when visually found.	*Too large hoisting angle *Fatigue caused by long use
	Visually check and measure for bends and deformation.	Replace when the dia. exceeds 8.3mm