

LIFTING DEVICE

DEVICE NAME: 1/2 TON PLATE CLAMP

ENGINEERING NOTE NUMBER: 86

DRAWING NUMBER: N/A

APPLICABLE STANDARD: 8

RATED LOAD: 1/2 TON (1000 #)

TEST LOAD: 3000 #

TEST LOAD PERCENT: 300

LAST LOAD TEST DATE: 1 MARCH 1997 (SEE ATTACHED CERTIFICATE)

COLOR: BLUE / GRAY

STRESS CALCULATIONS:

Done by: _____

Date: _____

Reviewed by: _____

Date: _____

REMARKS:

THIS IS A COMMERCIAL PLATE LIFTING FIXTURE.

IDENTIFICATION:

Engineering Note Number & Rated Load Must be Clearly Marked On a Conspicuous Surface.

CAMPBELL-COOPER TOOLS

Campbell Clamps Maintenance and Repair

It is extremely important to set up a regular clamp inspection procedure. The frequency of inspection will depend, of course, on clamp usage, and it may vary from one department to another. Campbell (formerly Merrill) Clamps are built to withstand rugged treatment. However, grit, dirt, sludge and mud should be removed. This can easily be accomplished by immersing the entire clamp in a can of de-greaser overnight. Also, periodic oiling at all pins and rivets will improve performance and help extend the life of the clamp.

You may wish to stamp or paint a tool number on the clamp and maintain a written record, indicating inspection date, condition and repairs made. Inspection records should be reviewed periodically.

Suggested Inspection Form

Clamp No. _____					Department _____				
Frequency of Inspection _____									
Make notes on reverse side as to any special findings or repairs made.									
Date	Cam OK or Replaced	Pad OK or Replaced	Linkage OK	Shackle OK	Body OK	Chain OK or Replaced	Reconditioned Clamp	Replace Clamp	Inspector



Excessive wear in the middle of cam working face. Compare to sharpness of teeth at base.

Cams

These are the parts subjected to the most wear. Continual use on plates of the same thickness will cause wear in only one area of the cam's working surface and require earlier cam replacement. Also, the harder the plate, the greater the wear on the cam, even though the cam is heat treated for maximum surface hardness. The ductile core hardness helps prevent breakage when the clamp is subjected to side strains. Experience in your own shop will dictate how frequently cams should be replaced.

A simple visual inspection of the cam is usually all that is necessary. Compare the worn area with any unused surface. If the teeth appear to be flattened by 50%, the cam should be replaced.

Pads

Campbell "G" and "BB" clamps use a drive-type pad. It is rare to find the pad seat damaged, but if the teeth are worn by 50% the pad should be replaced. With the linkage removed, drive the pad out with a punch. Grease the tong of the new pad and place it in the grease hole. Place a soft steel or brass set between the side plates and against the serrations of the new pad. Drive the set with a hammer until pad is seated. The side plate rivets are ductile and hold the tong of the pad securely, with no riveting required. Replace inside parts with a radius link in position as shown.



Correct assembly of linkage.



Note spread in clamp opening. The body should be replaced.



Do not use bolt to replace rivet.



Spread shackle and "G" Link. A result of side pull.

Spread Jaw

Check the clamp's throat width. At zero grip, the cam should be at full contact with the pad. If the width at the base (where the pad is located) is greater than at the top, the clamp has been overloaded and should be replaced. Do not weld the clamp body, as this may destroy the original heat treatment.

Loose Rivets

Although linkage should be free working, rivets may need to be replaced when very loose. If the rivet hole in the shackle, "G" link or radius link is stretched or enlarged (usually from overloading), these parts should be replaced. It is usually advisable to replace the rivet, as well.

Pins and Springs

Pins do not rotate in the body, and under normal work loads they do not require replacement. However, inspect them for bending caused by overloads, and replace as needed. If the clamp has a spring, it should be of sufficient strength to hold the cam against the pad. If not, replace it.

"G" Clamps

Remove pins from clamp body, slip inside linkage out and inspect visually. To replace any worn parts, drive rivets out over a relief opening such as a small section of pipe or a vice.

Check to be sure the shackle is not bent at the rivet, an indication of side pull. If this is a recurring fault, use a universal joint or a chain connector on the clamp. Slight distortion can be corrected by hammering closed. Do not, however, use welding or substitute a bolt for the rivet.

"E" Clamps

If the spring does not give initial pressure at near zero grip, replace it. When replacing pad, be sure it can move up and down for ease of release.

"MK" Clamps

To replace cam and lock assembly, follow the instructions supplied with the replacement parts.

Chains

Chains supplied with clamps should also be inspected carefully. Use a Campbell Wear Gage for this purpose. Inspect chains link by link, checking for: distorted links; cracked links; nicks or gouges; pitted links; excessive wear at bearing surfaces and barrels; stretched links.

CERTIFICATE OF TEST

WORLD WIDE LIFTING CLAMPS — COOPERTOOLS

CATALOG # 642-3000 #642-3300
642-3100 #642-3500
642-2012 #642-3800

WLL 1/2 ton

GRIP 1/16 in. to 5/8 in.
1 mm to 16 mm

This clamp has been subjected to a vertical pull equal to 3 times Working Load Limit expressed in Short Tons or equal to 2.7 times Working Load Limit expressed in Metric Tons. When operating, do not exceed the Working Load Limit of the clamp!

Tested by JIM HAWTHORNE

Date Tested MAR 0 1 1997

Serial No. 9740826
(Number stamped on clamp body)

CooperTools
45 Cleveland Street
Cortland, NY 13045
Tel: 607-756-2821
Fax: 607-756-7226

S16W01F5-10/27/95

Merrill Clamp Operating Instructions WARNING

Do not use the attached clamp until the operators instructions have been read thoroughly. Improper use or maintenance may result in serious injuries. After thoroughly reviewing the instructions, please give them to your supervisor to file for future reference. Additional copies are available from Campbell at the address below.

1. Do not exceed Working Load Limit.
2. Inspect clamp before each lift.
3. Do not lift more than one plate at a time.
4. Position clamp to balance load.
5. Insert plate to full depth of throat opening.
6. Lift slowly and smoothly. Do not jerk load.
7. Stand clear of load when lifting.
8. Do not use a damaged clamp.
9. Do not use any Merrill Clamp to lift tapered plates or beams.
10. When lifting plates with hardness over 43 Rockwell C/400 Brinell consult clamp mfg.

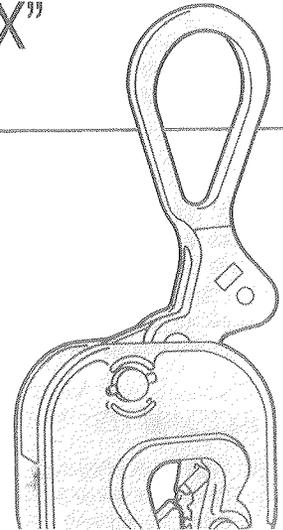
COOPER
CooperTools

Cooper Tools, P.O. Box 728, Apex, NC 27502
Phone 919-362-7510

Form No. 3270

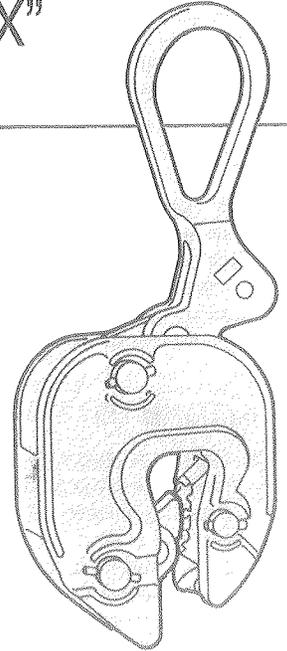
Operator's Manual

Campbell®
Model "GX"
Clamp



Operator's Manual

Campbell®
Model "GX"
Clamp




COOPER

CAMPBELL-CORTLAND PLANT

45 Cleveland Street, Cortland, NY 13045
607-756-2821

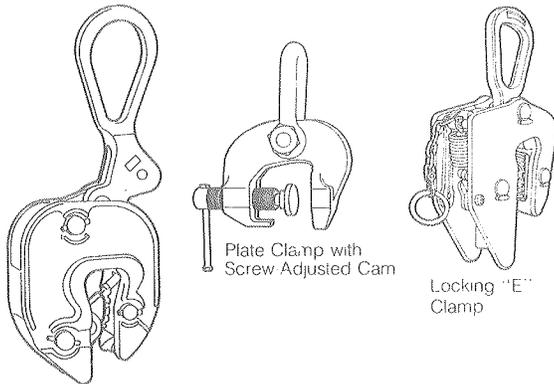

COOPER

CAMPBELL-CORTLAND PLANT

3653-61 rev 94

Campbell® (formerly Merrill) Lifting Clamps

Campbell clamps are known and used throughout the world for lifting, conveying and positioning of sheet, plate, weldments and structurals. Within their capacity, the heavier the load, the tighter they grip. Parts are drop forged for strength, dependability and long life, and all clamps are individually proof tested. Replacement parts are available when needed. If you have any doubts as to the clamp best suited to your application, contact your Campbell distributor.



Model "GX"
Clamp

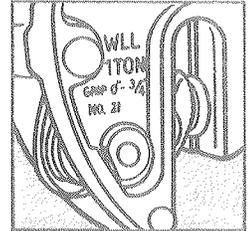
Plate Clamp with
Screw Adjusted Cam

Locking "E"
Clamp

Operating Guidelines for Safer Material Handling



1. **Know the application.** Before using any Campbell clamp, refer to the application section of this manual to be sure the lift to be made is appropriate for this style clamp.
2. **Do not exceed the capacity of the clamp.** Every Campbell clamp has its rated weight capacity and grip range forged or stamped into the body. Always use a clamp with a grip and lifting capacity in excess of the thickness and weight of the plate or member being lifted.



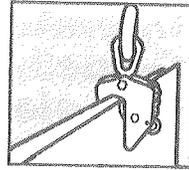
3. **Inspect clamp before each lift.** Refer to the maintenance and inspection pages of this manual for details.
 - a. Check the cam and pad for excessive wear. If one of the surfaces is approaching the maximum allowable wear, it should be replaced. If either the cam or pad must be replaced, it is recommended that the other be replaced also.
 - b. Check the shackle and visible linkage to be sure they are not bent or excessively worn. If so, replace them.

Warning: Do not try to straighten any bent component. Replace it. Do not use any clamp in need of repair, or that has been overloaded.

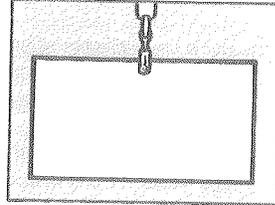
4. **Use only the manufacturer's recommended replacement parts.**

5. Do not lift more than one plate at a time.

NO!



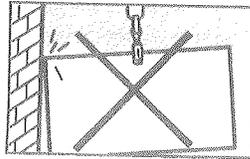
6. Position the clamp to balance the load. Position the clamp so the lifting force exerted by the crane is directly in line with the lifting shackle and the load is evenly distributed.



Warning: Beware of side loading. Never exceed an angle of 10° from vertical when using a clamp.

7. Insert plate to full depth of throat opening. It is imperative that the cam and pad have maximum contact on the plate to insure a good firm grip on the plate being lifted.

8. Lift slowly and smoothly. Do not jerk load. Shock loading can damage the clamp.



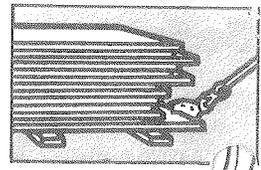
Warning: Great care should be taken to not bump or lessen the load on the cam, which may cause non-locking clamps to release.

9. Stand clear of load when lifting. The operator should stand clear of load and should never lift over other people or machinery.

10. Never alter a clamp. Clamp manufacturer's specifications include specific materials and manufacturing procedures. Never grind, weld or in any way alter clamp, as this could cause severe damage or failure.

NEVER!

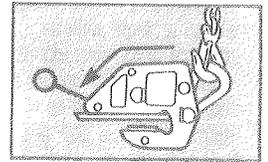
11. Do not misuse a clamp. Never lift a plate from the bottom of a stack. Never lift horizontally using a vertical lifting clamp. Do not improvise.



12. Never attach a clamp directly to the crane hook. Use a sling between the crane hook and clamp to minimize interference in clamp operation and its ability to maintain a proper position on the plate.

13. Never tamper with the locking mechanism of a locking clamp while making a lift. Always use in "lock closed" position.

14. Always place pad side (short leg) of clamp under plate when lifting from horizontal to vertical with clamps other than the GX models.

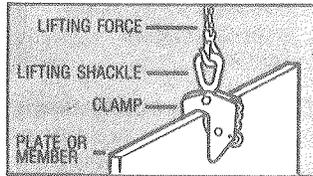


15. Know type of material to be moved before making lift. Some exotic steels are too hard to allow teeth of cam to penetrate. Special cam designs may be required. This may also be true of structural members and fabricated sections. If plates hardness exceeds 400 Brinell, consult the manufacturer for recommendations.

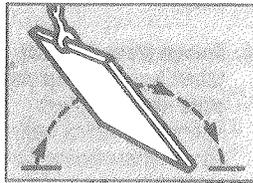
16. Do not lift tapered beams or members.

Definitions

1. **Vertical lift:** The lifting of a vertical plate or member in which the lifting force exerted by the rigging is evenly distributed and is directly above and in line with the clamp's lifting shackle. This is illustrated to the right.



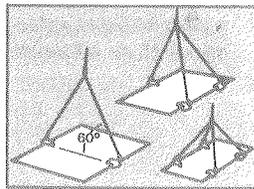
2. **Vertical turn/lift:** A vertical turn/lift clamp is one designed to turn a single plate or member from horizontal to vertical thru a 90° arc; or from horizontal to vertical to horizontal thru a 180° arc.



3. **Horizontal lift:** Multiple clamps are attached to the sides of a horizontal plate. The clamps are attached to a multi-leg sling centered over the plate. Refer to illustrations.

Warning: The capacity of all horizontal clamps is based on a sling angle of 60°. See illustration (right). Sling angles less than 60° increase the load exerted on the clamps.

Warning: Horizontal clamps are rated in pairs. One half of the rated capacity is the maximum allowable load for one clamp.

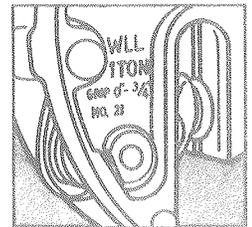


4. **Finished and polished plates:** Steel plates such as stainless which have other than hot rolled surfaces are generally handled with non-marring clamps having at least one smooth gripping surface. Extra caution is therefore required.

5. **Structural members and fabricated sections:** Unless otherwise specified, clamps recommended for structural members and fabricated sections are limited to hot rolled steel products with a Brinell hardness not exceeding 300. For other or unusual applications, contact Campbell Chain for lifting recommendations.

6. **Rated capacity:** The rated capacity of a Campbell clamp is based on a clamp in "new" or "as new" condition. It represents the maximum load the product is to be subjected to when used in a manner described in this manual. Wear, misuse, abuse and other factors relating to usage may reduce the rated capacity. Shock loading and the factors listed must be taken into consideration when selecting a Campbell clamp for a given application.

7. **Working Load Limit:** The maximum load that should ever be applied to a Campbell clamp. The working load limit is forged or stamped on the body of every clamp. Each clamp is tested in excess of the working load limit.



8. **Maximum and minimum plate thickness:** The size plate a clamp is capable of lifting.

Warning: Never lift a plate that is not within the grip range forged or stamped on the clamp.

9. **Jaw opening:** The capacity (grip range) of a clamp in terms of plate thickness.

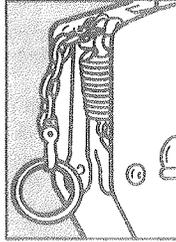
Warning: Never lift a plate that is not within the grip range forged or stamped on the clamp.

10. **Operating temperatures:** Unless otherwise specified in the application section of this manual, Campbell clamps are designed to operate only in temperatures ranging from 0°F to 200°F. This range applies to both the ambient and material temperatures.

Warning: Contact Campbell Chain before using Campbell clamps in temperatures not within this range.

11. **Locking clamps:** Clamps equipped with a spring, a tension arm and a chainpull that places and keeps the cam in contact with the plate. The mechanism facilitates attaching and removing the clamp.

Warning: Never tamper with a clamp's locking mechanism during a lift.



12. **Lock open-lock closed:** A lever or chain actuated spring holds the cam away from or in contact with the plate, and this makes clamp operation easier. The Campbell "MK" and "E" clamps have this feature. These clamps will not lift plate when in the "lock open" position.

13. **Warning:** A notice pointing out danger, apprising the operator and others that they should protect themselves.

Operating Instructions

"GX" Clamp

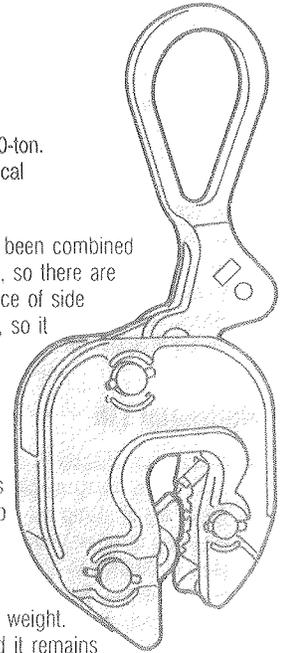
The "GX" clamp is available in six capacities: 1/2-, 1-, 2-, 3-, 5-, and 10-ton. The "GX" can be used for both vertical and horizontal-to-vertical lifting.

The shackle and "G" link have been combined into one part in the "GX" clamps, so there are fewer stress points and less chance of side loading damage. The pad swivels, so it remains in constant contact with the work face of the load, even when the load is being turned through 180°.

The throat of the clamp is wider at the back. This eliminates "wedging" and makes it easier to insert the plate to the full depth of the throat. Also, the back of the throat has a beam design for greater strength relative to clamp weight. Because the cam is spring-loaded it remains engaged under "no load" conditions. This is especially important for turning plates from horizontal to vertical.

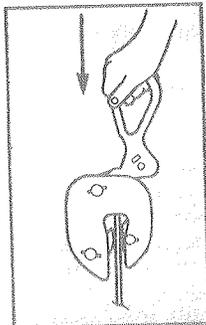
The most exclusive feature of the "GX" clamp is its wear indicator system (Patent pending.) When the cam's straight line, convex teeth are flattened between the unique wear indicator grooves, it's time to change the cam.

The Campbell "GX" clamp is entirely drop forged and heat treated. Gripping surfaces are of case-hardened tool steel. The working mechanism is entirely enclosed for protection.



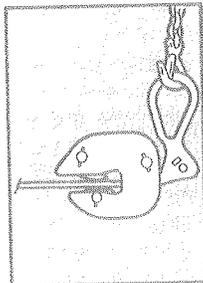
Vertical Lift

1. Press down on the shackle to retract the cam. Place clamp squarely on plate to the full depth of throat opening. Release shackle so that cam engages plate. You are now ready to make the lift.
2. To release plate, press down on the shackle and lift clamp off plate. New swiveling pad makes release easier. If cam sticks, however, a slight tap on the shackle will release it.



Horizontal Lift

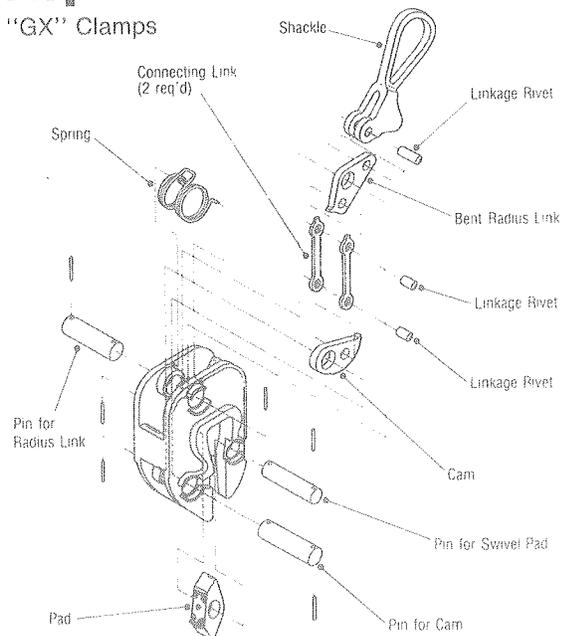
1. Press in on shackle to retract cam. Place clamp on plate. (Short leg of clamp may be either up or down.) Make sure plate is inserted to full depth of throat opening. Release shackle so that cam engages plate. You are now ready to make lift.
2. Release clamp by pressing down on shackle. If clamp should be difficult to remove, a slight tap on shackle will facilitate release.



WARNING: Do not remove spring.

Replacement Parts

"GX" Clamps



CAPACITY	1/2-TON	1-TON	3-TON	5-TON	10-TON		
GRIP	1/16"-5/8"	1/16"-3/4"	1/16"-1"	1/2"-2"	1/2"-2 1/2"		
Part Name	Cat. No.	Qty.	Cat. No.	Qty.	Cat. No.	Qty.	
Shackle	650-1005	1	650-1305	1	650-1505	1	
Radius Link	650-1002	1	650-1302	1	650-1502	1	
Spring	650-1016	1	650-1316	1	650-1516	1	
Connecting Link	650-1007	2	650-1307	2	650-1507	2	
Cam	650-1001	1	650-1301	1	650-1501	1	
Pad	650-1017	1	650-1317	1	650-1517	1	
Cam Kit	650-5020	1	650-5022	1	650-5023	1	
Cam & Radius Link Pin	650-1003	3	650-1303	2	650-1503	2	
*Swivel Pad Pin	**	650-1104	1	650-1304	1	650-1504	1
Rivets	650-1008	3	650-1308	3	650-1508	3	

**The swivel pad pin on this model is the same as the cam and radius link pin.

* Drive Pins Included

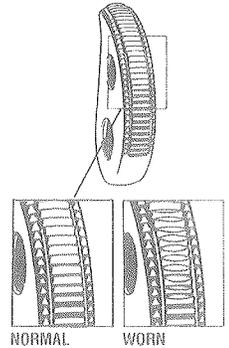
Clamp Inspection, Maintenance and Repair

It is important to establish a regular procedure for clamp inspection. Frequency of inspection will depend upon the amount of use the clamp receives, and may well vary from one department or area to another. Campbell clamps are built to withstand rough treatment. Grit, dirt, sludge and mud should be removed, however. This can be done easily by immersing the entire clamp in a can of degreaser and leaving it there overnight. Also, periodic oiling of all pins and rivets will improve performance and help to extend the life of the clamp. You may wish to maintain a written record, indicating inspection dates, condition of the clamp on each of those dates, and any repairs made. Inspection records should be reviewed periodically.

Clamp No. _____		Department _____							
Frequency of Inspection _____									
Make notes on reverse side as to any special findings or repairs made.									
Date	Cam OK or Replaced	Pad OK or Replaced	Linkage OK	Shackle OK	Body OK	Chain OK or Replaced	Reconditioned Clamp	Replace Clamp	Inspector

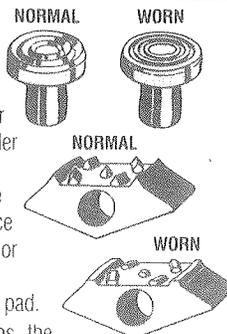
Inspection Procedure

Cams—The cam of the "GX" clamp has a unique, double-groove, wear indicator system that clearly shows you when the cam should be replaced. When the flat area on the cam's straight line, convex teeth reaches the wear indicator grooves, it's time to change the cam. This important feature takes the guesswork out of proper clamp maintenance.



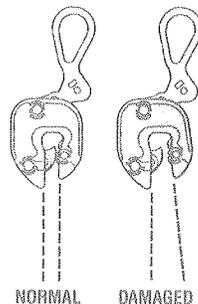
Pads—Campbell clamps in the "MK" style utilize drive type pads. It is unusual for the pad seat to be damaged, but should serrations be worn by 50% or more, the pad should be replaced. In order to do this, first remove the linkage, then use a punch to drive out the pad. Grease the long of the replacement pad and place it in the hole provided. Insert a soft steel or brass set between the side plates and against the serrations of the replacement pad.

In the case of the "E" and "GX" clamps, the inspection procedure is the same, except that the pad is bolted in and can be replaced by simply removing the bolt. When replacing the pad, be sure that it can be moved up and down for easy release.



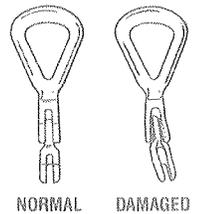
Clamp Body—Check the throat width of the clamp. At zero grip, the cam should be in full contact with the pad. If the width at the base (where the pad is located) is greater than the width at the top, the clamp has been overloaded and should be replaced.

Warning: Do not weld the clamp body, as this may destroy the original heat treatment.

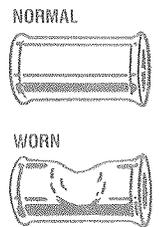


Linkage and Shackle Inspection—To remove the linkage from a "GX" or "MK" clamp, remove the load pins from the body. (The "Z" spring must also be released on the "MK"). The pins do not rotate, and under normal load do not require replacement. They should be inspected for bending, which is caused by overloads, and replaced as needed.

Inspect the shackle for bending at the rivet, which is an indication of side pull. If this is a recurrent fault, use a chain connector on the clamp. If the clamp is a "GX"-style, it is also advisable to check the shackle for spreading at the base, which is still another indication of side pull.



Rivets—Rivets may require replacement when a very loose connection is detected. Linkage should normally be free working. Should a rivet hole in the shackle, "G" link, radius link or connecting link become stretched or enlarged (usually resulting from overloading), those parts should be replaced. It is advisable to replace the rivet as well. To replace any worn parts, drive rivets out over a relief opening, such as a small section of pipe or the opening in a vise.



Warning: Do not weld or substitute bolts for rivets. Check connecting links to ascertain that they are not bent.

Springs—If a "GX" clamp is equipped with a spring, testing for replacement is simple. The spring should be of sufficient strength to hold the cam against the pad. If it is not, the spring should be replaced. In the case of the "E" clamp, the spring should be replaced if it fails to provide initial pressure at near zero grip.

Chains—Chains supplied with clamps should also be inspected carefully. To do this, use a Campbell wear gauge. Inspect chains link by link, checking for distorted, stretched or cracked links, nicks or gouges, pitted links and excessive wear of bearing surfaces and barrels.

