

**WARNING:**  
Before putting tool in service,  
take to your immediate  
supervisor.



**RENFROE**



Model NMBL Clamp  
Application, Operation and Maintenance Manual  
OM NMBL 0809



# Operators Manual

This Operator's Manual covers the Application, Operation and Maintenance of this RENFROE product. Operator's Manuals for other current RENFROE products are available upon request. Direct Requests to J.C. Renfroe & Sons, Inc., Jacksonville, Florida 32201.

**J.C. RENFROE & SONS,  
INCORPORATED**

of Jacksonville, Florida, has been an international leader in the manufacture and marketing of Lifting Clamps for over fifty years. **RENFROE** products are manufactured in Jacksonville, Florida. A worldwide network of stocking distributors provides a readily available source of supply and service.

**J.C. RENFROE & SONS,  
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THIS PUBLICATION SUPERSEDES ALL PREVIOUSLY PUBLISHED AND/OR DISTRIBUTED INFORMATION BY MANUFACTURER AND/OR ITS DISTRIBUTORS WITH RESPECT TO APPLICABLE RENFROE PRODUCTS AND SUBJECT MATTER DESCRIBED OR CONTAINED HEREIN.

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### **WARNING:**

Prior to selection, operation and/or maintenance of RENFROE products, read and understand the information provided in this manual.

The understanding and use of the Definitions are important in determining the limitations and proper application of RENFROE products.

Failure to review and utilize recommended applications, operation and maintenance instructions may result in serious injury to operator and others.

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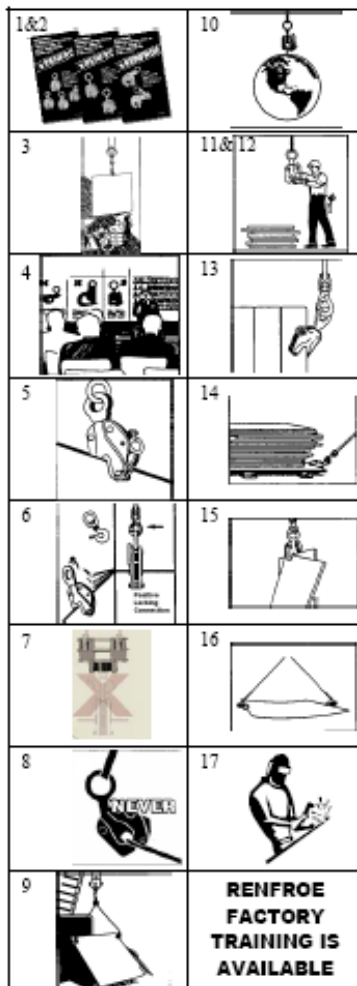
#### **NOTICE OF EXCLUSION OF WARRANTY**

**RENFROE HAS HEREIN SET FORTH IN CONSPICUOUS LANGUAGE AN EXCLUSION OF ANY WARRANTY EITHER EXPRESSED OR IMPLIED, WHICH IS NOT SPECIFICALLY AND PARTICULARLY CONTAINED HEREIN. PLEASE REFER TO THAT STATEMENT FOR REPRESENTATIONS AND WARRANTIES OF PRODUCTS MANUFACTURED BY J.C. RENFROE & SONS, INC.**

# OPERATING AIDS

## (DO'S AND DON'TS)

1. DO read and understand the operator's manual before using clamp.
2. DO consult Operator's Manual or RENFROE when in doubt.
3. DON'T lift over workmen. DON'T lift over safety areas or personnel.
4. DO attend a factory training class for establishing proper use of Renfro Products.
5. DO Lock clamp closed when clamps are fitted with a lock. DON'T lift with lock in open or "lock open" position.
6. DON'T use a connection that may release the clamp.
7. DON'T attach clamp directly to crane hook. DO use a flexible connection between crane hook and clamp shackle. DON'T use heavy flexible connection.
8. DO use correct clamp for job. DON'T use large capacity clamps to lift light loads.
9. DO use an adequate number of clamps to balance load. DON'T lift loads that are not balanced.
10. DO use clamps within their rated capacity. DON'T overload clamps.
11. Do inspect clamp before each lift, follow inspection and maintenance instructions outlined in the manual and use RENFROE replacement parts to assure proper operation of the clamp.
12. DON'T use clamp that has been overloaded. DO refer to pre-lift inspection in Operator's Manual.
13. DON'T side load with a straight shackle clamp.
14. DON'T misuse. DON'T lift plate from bottom of plate stack.
15. DON'T rush. DON'T lift more than one plate at a time with a vertical clamp.
16. DON'T improvise. Always use correct clamp for the job. DON'T lift plate horizontally with a vertical lift only clamp.
17. DON'T alter clamp. DON'T grind, weld or modify the clamp in any manner.



**J.C. RENFROE & SONS, INC.**

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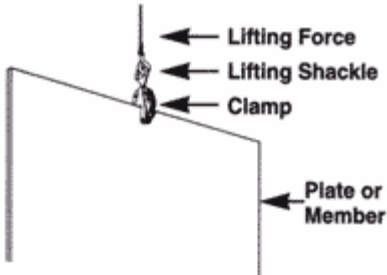
# OPERATING AIDS (DO'S AND DON'TS)

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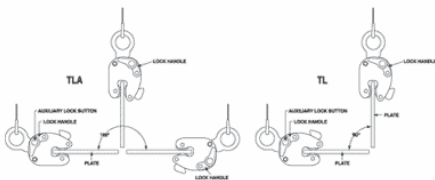
1. DO Consult Operator's Manual or RENFROE when in doubt. RENFROE factory representatives are available upon request at no charge to train and assist in establishing the proper use of RENFROE products.
2. DO Lock clamp closed before lifting load. NEVER lift with lock in open or "Lock Open" position.
3. DO Use safety hooks. NEVER use a hook that may release clamp.
4. DO Use correct clamp for job. NEVER use large capacity clamps to lift light loads.
5. DO Use an adequate number of clamps to balance load. NEVER lift loads that are not balanced.
6. DO Use clamps within their rated capacity. NEVER overload clamps.
7. DO Inspect clamp before each lift, follow inspection and maintenance instructions outlined in this manual and use RENFROE replacement parts to assure proper operation of the clamp.
8. DON'T Side load. NEVER lift from side with vertical clamp.
9. DON'T Lift over workmen. NEVER lift over Safety Areas or personnel.
10. DON'T Misuse. NEVER lift plate from bottom of plate stack.
11. DON'T Rush. Never lift more than one plate at a time with a vertical clamp.
12. DON'T Improvise. Always use correct clamp for job. NEVER lift horizontally with a vertical clamp.
13. DON'T Use clamp that has been overloaded.
14. DON'T Alter clamp. NEVER grind, weld or modify the clamp in any manner.
15. DON'T attach clamp directly to crane hook always use sling between crane hook and clamp.
16. DON'T improvise. Always use correct clamp for the job. DON'T lift plate horizontally with a vertical lift only clamp.
17. DON'T alter clamp. DON'T grind, weld or modify the clamp in any manner.

# DEFINITIONS

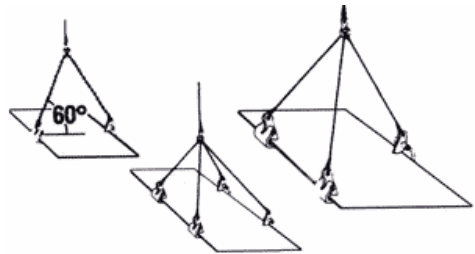
**VERTICAL LIFT:** The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



**VERTICAL TURN/LIFT:** A vertical turn/lift clamp is a vertical lifting clamp specifically intended to turn a single plate or member thru a ninety degree ( $90^\circ$ ) arc and back to vertical thru the same ninety degree ( $90^\circ$ ) arc or from horizontal to vertical to horizontal thru a one hundred and eighty degree ( $180^\circ$ ) arc. Refer to Application Section of specific Turn/Lift clamps for further detail. During the turning operation the edge of the plate opposite the edge to which the clamp is attached should always be in contact with a supporting surface such as a factory floor and the load on the clamp not exceed one half rated capacity of clamp—refer to illustrations shown below.



**HORIZONTAL LIFT:** Clamps (used in pairs or multiples) are attached to the side edges of a plate or bundle of plates positioned horizontally to the floor level. The rigging attached to clamps is generally multi-legged slings with the connecting point of the slings being approximately centered between the distance separating the clamps. Refer to illustrations shown below. **WARNING:** The capacity of all horizontal clamps is based on a sling angle of sixty degrees ( $60^\circ$ ). See illustration below. Sling angles less than sixty degrees ( $60^\circ$ ) increase the load exerted on the clamps, Never exceed the rated capacity of a single clamp.



**STEEL PLATES:** Unless otherwise specified, lifting clamps are manufactured to handle hot-rolled steel plates whose Brinell Hardness does not exceed 300. **WARNING:** Do not lift plates with coatings or mill scale that prevent the gripping surfaces of the clamp from making positive contact with the base metal.

For applications not covered by the above information, secure written recommendations from RENFROE.

**FINISHED AND POLISHED PLATES:** Steel plates in this category have other than hot-rolled surfaces such as stainless steel, etc., are generally handled using non-marring clamps incorporating smooth gripping surfaces. **WARNING:** For applications using clamps with serrated gripping sur-

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**faces on finished or polished plates, secure written recommendations from RENFROE.**

**STRUCTURAL MEMBERS — FABRICATED SECTIONS:** Unless otherwise specified, clamps described as capable of handling structural members and fabricated sections are limited to hot-rolled steel whose Brinell Hardness does not exceed 300. **WARNING: For applications not covered by the above information, secure written recommendations from RENFROE.**

**RATED CAPACITY:** The rated capacity of a RENFROE product is based on the product being in “new or as new” condition and represents the maximum load the product is to be subjected to when utilized in the 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 RENFROE product for a given application.

**PLATE THICKNESS:** The minimum and maximum plate thickness a clamp specified for handling plates is capable of lifting. **WARNING: Never use a clamp for lifting a plate where the plate thickness is less than or greater than the minimum and maximum stenciled on the clamp.**

**JAW OPENING:** The minimum and maximum thickness of a member of clamp specified as having a JAW OPENING is capable of handling. **WARNING: Never use a clamp on a member whose thickness is less than or greater than the range of jaw**

**opening stenciled on the clamp.**

**OPERATING TEMPERATURES:** Unless specified under the Application Section of the individual model, the approved operating temperature of RENFROE clamps is from zero degrees Fahrenheit (-18 Celsius) to a maximum of 200 degrees Fahrenheit (+93 degrees Celsius). The minimum and maximum temperatures apply to both ambient and the material being handled by the clamp. **WARNING: Secure written authorization from RENFROE before using clamps in temperatures other than shown.**

**“HOT LIFTS”:** The Model R and S clamps are available in modifications that are capable of making lifts where the temperatures of the member being lifted exceeds 200 degrees Fahrenheit (+93 degrees Celsius). Depending on conditions a lift may exceed 1000 degrees Fahrenheit (538 degrees Celsius). The exact application and temperatures of the plates to be handled are critical in selecting the proper model. **WARNING: Secure written instructions from RENFROE for all hot lift applications.**

**LOCKING CLAMPS:** Locking clamps are divided into the categories listed below. With the exception of the “Locking Wedge” and “Locking Screw” type the purpose of the locks are to facilitate the attaching and removing of the clamp from the member being handled.

**“LOCK CLOSED”** - an over center spring loaded mechanism in which the spring exerts a force on the gripping cam when the lock handle is moved to the “Lock Closed” position. When the

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handle is moved to unlocked position the force exerted by the spring is relaxed and the gripping cam may be retracted by pushing the lifting shackle into body of clamp. Refer to the Operation Section of specific models of "Lock Closed" clamps for additional details. Typical "Lock Closed" clamps are Models DG, FR and M.

"LOCK OPEN ONLY" - normally used on "Hot Lift" clamps and consists of a manually operated "Lock Stop Pin" that is inserted when gripping cam of clamp is retracted and removed when clamp is positioned on the plate. Tag line may be used to permit operator to remove pin from a greater distance from clamp. Refer to the Operation Section of specific model of "Lock Open Only" clamps for additional details. Typical "Lock Open Only" clamp is the Model RO.

"LOCK OPEN-LOCK CLOSED" - an over-center spring loaded mechanism in which the spring exerts a force on the gripping cam when the lock handle is moved to the "Lock Closed" position. When the handle is moved to the "Lock Open" the gripping cam is maintained in the retracted position for ease in installing the clamp on a plate or member. The Model FRD contains individual "Lock Open" and "Lock Closed" mechanisms that must be operated separately. Refer to the Operation Section of specific models of the "Lock Open-Lock Closed" clamps for additional details. Typical "Lock Open-Lock Closed" clamps are Models FRD, R, S, SD, SEA, SX, TL, TLA and the J-Series.

"LOCKING WEDGE" - is a fluted steel wedge that is driven in place with a

hammer. The body of the wedge is positioned in a slot in the clamp body with the fluted edges contacting the member to which the clamp is being attached. Refer to Operation Section of specific models of the "Locking Wedge" clamps for additional details. Typical "Locking Wedge" clamps are Model A1, B1, B2 and PB.

"LOCKING SCREW" - "Lock Screw" clamps depend on manually adjusting a screw to hold the gripping surface in place for lifting and removing the clamp from member being lifted. Refer to Operation Section of a specific model of "Locking Screw" clamps for additional details. Typical "Locking Screw" clamps are Models AC, ACP, NM, PC, SCP and SCPA.

NON-LOCKING: "Non-Locking" clamps have no mechanisms to aid in attaching or removing clamp from member being lifted. It is necessary to have position of clamp maintained on the member being lifted until a properly applied force is exerted to the lifting shackle. Refer to Operation Section of specific models of the "Non-Locking" clamps for additional details. Typical "Non-Locking" clamps are Model AST, ASTL, BD, HR, HDR and WHSR.

**WARNING:** A pointing out and notice of danger. The purpose of a "WARNING" is to apprise the operator and all other affected persons of the existence of danger of which he should be but may not be aware and to enable the operator to protect himself and others where applicable against such danger. An attempt is made herein to warn against reasonable and reasonably foreseeable danger in the proper use and possible reasonable misuse of RENFROE products described in this manual.



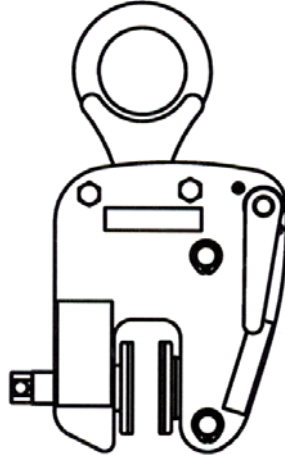
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**DESIGNATED PERSON** — A person selected by the employer or the employer's representative as being competent to perform those specific duties.

**QUALIFIED PERSON** — A person who, by possession of a recognized degree in an applicable field or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve problems relating to the subject matter at hand.

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## MODEL NMBL



### Application

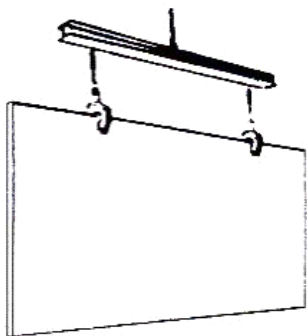
The Model NMBL (non-marring) clamp is manufactured with smooth gripping surfaces to prevent marring when gripping carbon steel, stainless steel, copper, aluminum and other polished metal plates. The clamp incorporates a "Lock Open" and "Lock Closed" feature to facilitate attaching and removing the clamp from the plate. Refer to Definition Pages for explanation of "Lock Open", "Lock Closed" clamp. An adjusting screw is used to compensate for various thicknesses of plates. The clamp is supplied with stainless steel gripping surfaces and is available with steel or bronze upon request.

The Model NMBL may be used to turn plates from the horizontal through a hundred and eighty degree arc. When used in this manner, the clamp should be attached to the plate such that the adjusting screw is positioned on the top side of the plate. The Model NMBL is not intended for use in transporting of plates using mobile equipment where shock loading may be severe.

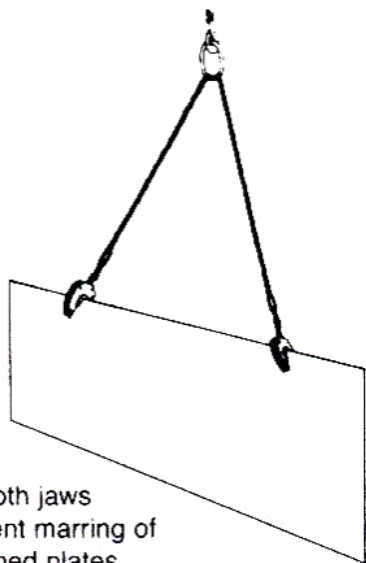
Due to the variety of conditions that may exist in handling plates, it is recommended the clamps be used in pairs and attached to a chain or wire rope sling, supported by a spreader bar. Refer to Illustrations on next page.

For identification of component parts, refer to the drawing of the clamp located at the end of the Maintenance Section.

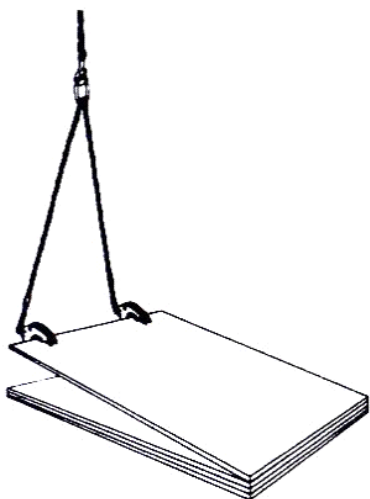
**WARNING: Do not use on plates containing oil, paint or mill scale. Do not use for transporting plates using mobile equipment. Refer to the sections on operation and maintenance for the approved procedures in the operation and maintenance of this product.**



A spreader bar may be employed for easy handling and positioning.



Smooth jaws prevent marring of polished plates.



Recommended for use in pairs.

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## Operation NMBL

### Step 1.

Before using any RENFROE clamp, refer to the Application Section to confirm the operation to be undertaken is recommended by RENFROE.

### Step 2.

Select appropriate capacity and plate thickness. The model designation, capacity and plate thickness are stenciled on each clamp.

**WARNING: Never exceed rated capacity or use on plates that are not within the range of plate thickness stenciled on the clamp. Lift only one plate on each lift.**

### Step 3.

Inspect clamp before each lift.

**WARNING: Do not use if in need of refurbishment.**

If in doubt, refer to the Maintenance Section for detailed maintenance instructions and the drawing on the clamp located at the end of the Maintenance Section for part identification.

- A. Check the clamp to be certain the Identification and warning tags are present and legible.
- B. Do not use the clamp if the tags are missing or illegible
- C. Inspect gripping surfaces for wear and defects.
- D. Adjusting Screw should turn freely by hand. Binding indicates damage that would impair proper operation of the clamp.
- E. Inspect operation of linkages and Lifting Shackle. All components should move freely. Binding indicates damaged parts. Check for bent shackle leg and elongation of shackle eye and pin hole.
- F. Inspect body for wear and damage particularly inside the jaw opening for distortion. Check cam pin holes for elongation.
- G. Inspect for bent and distorted Pins. Retaining rings should turn and be contained securely in the groove at end of the pins.
- H. Inspect for distortions on both gripping surfaces.
- I. Remove any clamp from service if in need of repair.

### Step 4.

The clamp is a component of the rigging used in lifting or transporting a plate. It is important to use safe and adequate rigging. The lock is used to hold the clamp in place until the gripping mechanism is actuated by a force applied to the Lifting Shackle.

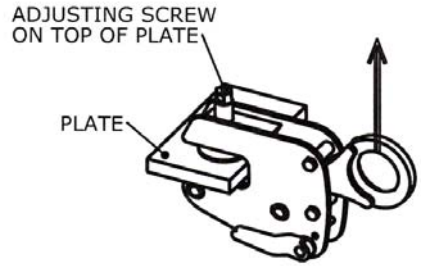
**WARNING: Improper or excessively heavy rigging may interfere with the operation of the clamp and its ability to maintain a proper position on the plate. Never attach crane hook directly to the clamp. Always use a sling between crane hook and clamp.**

### Step 5.

Install clamp on the plate to be lifted. When clamp is used for lifting plate from horizontal through a hundred and eighty degree arc, the Adjusting Screw must be positioned on the top side of plate. Refer to Photograph A and Illustration A.



Photograph A

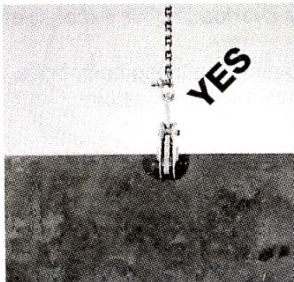


**ILLUSTRATION A**

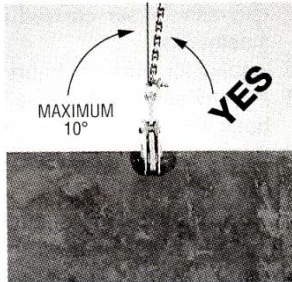
Step 6.

Position clamp so direction of force applied by the crane is in line with the lifting shackle.

**WARNING:** Never exceed ten degree side loading. Refer to Photographs C, D, E, F and G.



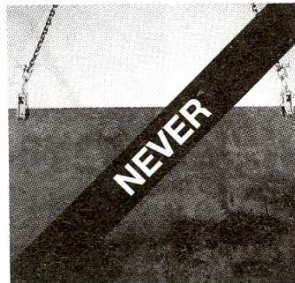
Photograph C  
Sling directly above and in line with lifting shackle.



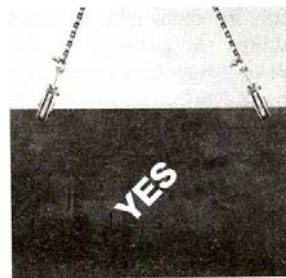
Photograph D  
Maximum allowable side loading.



Photograph E  
Excessive side loading.



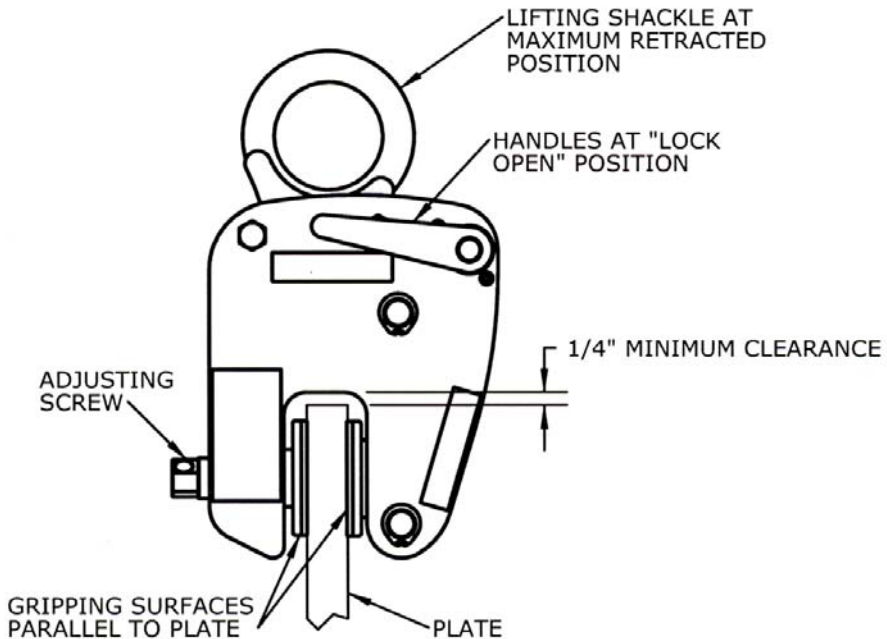
Photograph G (Typical)



Photograph F (Typical)  
Clamps in line with sling.

Step 7.

Move handle to "Lock Open" position (lifting shackle at maximum retracted position toward the body of the clamp). Turn Adjusting Screw until the gripping surfaces are parallel and against the surfaces of the plate being lifted. Maintain 1/4" clearance between the inside of the jaw opening and the top edge of the plate. Refer to Illustration B.

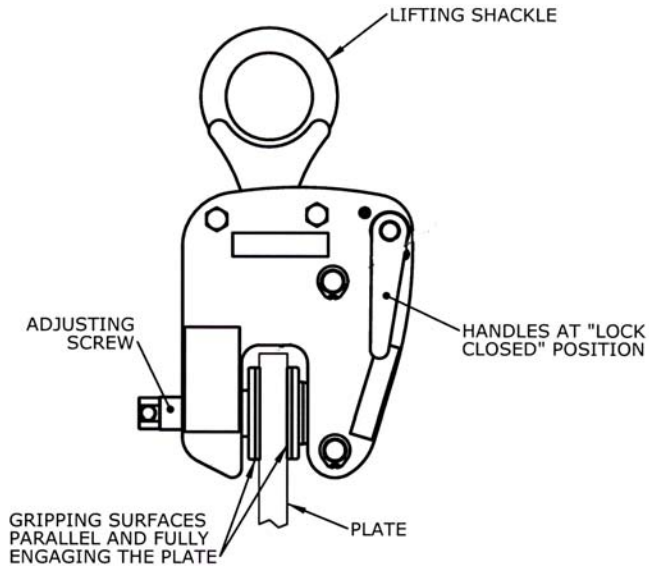


**ILLUSTRATION B**

Step 8.

With both gripping surfaces parallel and fully engaging the plate, loosen the Adjusting Screw one full turn then move handles to "Lock Closed" position. The clamp should be firmly attached to the plate and able to hold its position. Check attachment by exerting force on the Lifting Shackle. If clamp position on plate moves, the clamp is not properly attached.

**WARNING:** Do not commence lift in the Handles are not in "Lock Closed" position and the gripping surfaces are not parallel and fully engaging the plate. Refer to Illustration C.



### ILLUSTRATION C

Step 9.

Commence lift.

**WARNING:** The operator should position himself away from and fully clear of the member to be lifted. Refer to Photograph L. Do not commence lift until all personnel are clear of the area of the lift. Never stand under or near a member being lifted. Do not permit the member being lifted to contact adjacent structures or equipment.



Photograph L

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Step 10.

To Remove Clamp. After the plate is fully supported and at rest in a stable position, relax lifting force. Loosen Adjusting Screw then move handles to "Lock Open" position. Remove clamp from the plate.

Step 11.

Inspect Clamp. Remove from service if in need of refurbishment.

**WARNING: In the event, the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing, do not use clamp until it has been properly labeled. Renfroe will replace tags at no charge upon request.**

Inspection kits are available at no charge upon request from the distributor or RENFROE. Inspection kits contain: Lifting Clamp Inspection Report Forms, Inventory and Maintenance Record Cards, Danger Tags and Monthly Inspection Stickers.



RENFROE clamps are constructed so the wearing parts may be replaced by installing individual parts or by using RENFROE Rebuild Kits containing all parts generally replaced due to normal wear.



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## **Maintenance Program for Renfroe Clamps Manufactured from Steel**

The severity of service to which the clamp is subjected in the work place determines the frequency and type of inspection procedure required for the clamp. The frequency and type of inspection is determined by the clamp owner. Renfroe acknowledges the ASME B30.20 safety standard which sets forth minimum inspection requirements for "Below-the-Hook" lifting devices and the Renfroe Recommended Inspection Schedule meets and/or exceeds the ASME inspection recommendations.

**Before using a clamp operators should be trained by a qualified person to visually inspect a lifting clamp that will include but not be limited to the following:**

### **Every lift Inspection:**

*A visual inspection by the operator before and after each lift made by the clamp.*

- Check the clamp to be certain the Identification and warning tags are present and legible.
- Do not use the clamp if the tags are missing or illegible
- Inspect gripping surfaces for wear and defects.
- Adjusting Screw should turn freely by hand. Binding indicates damage that would impair proper operation of the clamp.
- Inspect operation of linkages and Lifting Shackle. All components should move freely. Binding indicates damaged parts. Check for bent shackle leg and elongation of shackle eye and pin hole.
- Inspect body for wear and damage particularly inside the jaw opening for distortion. Check cam pin holes for elongation.
- Inspect for bent and distorted Pins. Retaining rings should turn and be contained securely in the groove at end of the pins.
- Inspect for distortions on both gripping surfaces.

Remove any clamp from service in need of repair.

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**WARNING: Do not use the clamp if in need of repair.**

If, during the every lift inspection, the operator believes the clamp exhibits excessively worn parts or is damaged, the clamp should be inspected by a qualified person who will make a determination as to its fitness to make a lift. At this time the condition of the clamp should be noted and recorded. After inspection by the qualified person it may be decided that a periodic inspection procedure is necessary.

**Frequent Inspection:**

*A visual inspection (see every lift inspection) by an operator or other designated person timed according to the clamps service class.*

- **Normal Service:** monthly
- **Heavy Service:** weekly to monthly
- **Severe Service:** daily to weekly.

If, during the frequent inspection, the operator or designated person believes the clamp exhibits excessively worn parts or is damaged the clamp should be inspected by a qualified person who will make a determination as to its fitness to make a lift. At this time the condition of the clamp should be noted and recorded. After inspection by the qualified person it may be decided that a periodic inspection procedure is necessary.

**Periodic Inspection:**

*A recorded inspection by a qualified person as described in the Periodic Inspection Procedure below timed according to the clamps service class.*

- **Normal Service:** annual
- **Heavy Service:** semi-annual
- **Severe Service:** quarterly.

If during any inspection a condition is found which leads to a periodic inspection then the next periodic inspection is due from the time the clamp is returned to service. See the table below.

**Normal Service-One Year**  
**Heavy Service-6 Months**  
**Severe Service-3 Months**

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**Warning: If any hazardous condition is found that may cause injury to the operator or other personnel then the clamp should be subjected to a Periodic Inspection by a Qualified Person.**

**Repair (replacement of worn parts)**

During regular maintenance when replacing parts that are worn a record should be made of the parts replaced. After the replacement of worn parts clamps need not be load tested.

**Repair (replacement of damaged parts)**

During a repair in which parts are replaced due to damage a record should be made of the repair. At this time the clamp should be marked with the following information as per the ASME B30.20 requirements:

- **Name and address of the repairer**
- **Repairer's unit identification**
- **Clamp weight (if altered)**
- **Rated load (if altered)**
- **ASME BTH-1 Design Category (if altered)**
- **ASME BTH-1 Service Class (if altered)**

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## **Model NMBL Periodic Inspection Procedures**

### Step 1.

Verify the identity of the clamp by checking the I. D. plate on the clamp body. If the I. D. plate is missing or not legible an RFID chip (Radio Frequency Identification Device) is embedded in the clamp body or a clamp component. If the I. D. plate is missing and the RFID chip is unavailable call the Renfro factory for instructions on returning the clamp for recertification.

### Step 2.

Completely disassemble clamp.

### Step 3

Remove all dirt, grease or other matter that may inhibit proper inspection of the clamp body and its components.

### Step 4 BODY

- A. Inspect welds for fractures. RENFROE recommends a dye penetrant or similar method of detecting indications on the clamp. If an indication is found it may be necessary to use a magnetic particle, ultrasonic or similar methods for determining damage to the clamp or components.
- B. Inspect internal and external surfaces for fractures and distortions.
- C. Inspect all pin holes for wear and elongation.
- D. Inspect inside jaw opening for displaced metal and distortion.
- E. Inspect internal threads for wear and damage
- F. Inspect spacer sleeve for wear and distortion.
- G. Inspect body bolts and nuts for wear and damage. Check tightness. Tighten if necessary.
- H. When replacing body bolt, tighten bolt and nut. Center punch bolt and nut at thread joint to lock nut in place.

**WARNING: Replace clamps containing fractures, elongated holes, distorted jaw opening or damaged internal threads. Replace body bolt and spacer sleeve if worn or damaged.**

### Step 5.

#### LIFTING SHACKLE NML-1

- A. Inspect Lifting Shackle Eye for elongation and wear particularly at point where eye engages sling attachment.
- B. Inspect lifting shackle pin hole for wear and elongation.
- C. Inspect lifting shackle leg for bending.

Elongated shackle eye indicates overloading. Elongated shackle pin holes indicate wear and possible overloading. Bent shackle leg indicates excessive side loading.

**WARNING: Replace lifting shackle that are bent, show excessive wear at eye or have elongated eye and shackle pin hole.**

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Step 6.

SHACKLE LINK NMBL-2

Inspect Shackle Link for elongated pin holes, wear and fracture.

**WARNING: Replace shackle link that has elongated pin holes, are worn or show fractures.**

Step 7.

CONNECTING LINK NMBL-3

Inspect Connecting Link for elongated pin holes, wear and distortion.

**WARNING: Replace Connecting Link with elongated pin holes, wear or distortion.**

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Step 8.

CAM LINK NMBL-4

- A. Inspect Cam Link for fractures, distortion and elongated pin holes.
- B. Inspect for wear particularly at areas where Cam Link engages link pin.  
Refer to exploded view.

**WARNING: Replace Cam Links that are fractured, worn, distorted or that has elongated pin holes.**

Step 9.

SPRING NMBL-5

Inspect Spring for wear and distortion. Spring legs must be 175 to 180 degrees apart. Refer to Illustrations D, E and F.

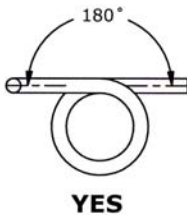


Illustration D

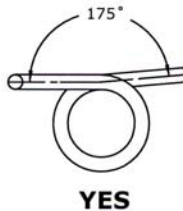


Illustration E



Illustration F

**WARNING: Replace Springs that are worn or distorted.**

Step 10.

PIN, CAM LINK and CONNECTING LINK NMBL-6; PIN, CAM GRIP, FLOATING, SHACKLE and SHACKLE LINK NMBL-7

Inspect all Pins for:

1. Distortion
2. Surface blemishes
3. Wear
4. Fractures
5. Inspect Pins with retaining ring groove for displaced metal, worn edges or foreign matter.

**WARNING: Replace Pins that are distorted, have surface scars, are worn or contain fractures. Replace Pins with displaced metal or worn edges at retaining ring groove. Retaining ring must be free to rotate and contained within the groove.**

Step 11.

LOCK ASSEMBLY NMBL-8, ROLLER NMBL-9, SPRING LINK NMBL-10

- A. Inspect Lock Assembly for damage and wear particularly on the area of the lock pawl where the Roller NMBL-9 and the Spring Link NMBL-010 are connected.

- 
- B. Check Lock Assembly for binding especially when moving Lock Assembly to the “Lock Closed” position. Binding indicates damage that would impair proper operation of the Lock Assembly. Check for damaged parts if binding occurs. Lock Assembly should pivot freely without binding.
  - C. Inspect Lock Assembly pivot shaft for wear. Shaft must have “slip fit” with handle and body pivot holes.
  - D. Inspect Roller and Spring Link for wear and fractures.

**WARNING: Do not alter or modify Lock Assembly. Use only component parts supplied by RENFROE. Replace Lock Assembly if worn or damaged. Replace Roller and Spring Link that is worn or contains fractures.**

Step 12.

CAM GRIP NMBL-11

- A. Inspect surface of Cam Grip. It must be smooth, free of fractures and the surface flat and parallel to the gripping surface of the gripping pad.
- B. Inspect pin holes for wear and elongation.
- C. Cam Grip must pivot freely with Cam Link.

**WARNING: Replace Cam Grips with worn or elongated pin holes and with damaged gripping surfaces.**

Step 13.

GRIPPING PAD NMBL-12

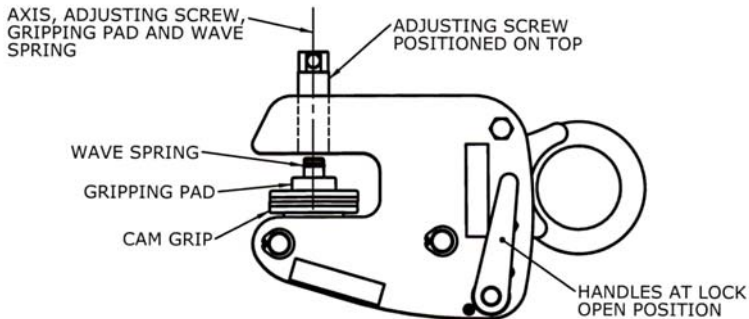
- A. To remove Gripping Pad from the Adjusting Screw, loosen or unscrew the adjusting screw until Gripping Pad lifts out from the Adjusting Screw. Removal of Gripping Pad destroys the internal Wave Spring NMBL-13. The used Spring must be discarded and replaced with a new unit.

**WARNING: Discard used Wave Spring. Do not attempt to reassemble the clamp with the old spring. Always install new Wave Spring NMBL-13 after disassembly of the Gripping Pad.**

- B. Inspect Gripping Pad for distortions, damage and wear. The surface must be smooth, flat and parallel to the gripping surface of Cam Grip. Retaining spring groove must be free of displaced metal, worn edges or foreign matter.

**WARNING: Replace worn, distorted or damaged Gripping Pad.**

- C. Install new Wave Spring into retaining groove of Gripping Pad. The spring must be fully retained in the groove width and centered about its axis.
- D. To install Gripping Pad. With clamp at “Lock Open” position, lay it down on a flat surface with Adjusting Screw positioned on top. Refer to Illustration G. Place the smooth surface of the Gripping Pad on top of Cam Grip. Align and center Gripping Pad axis with axis of Adjusting Screw. Turn Adjusting Screw until the Wave Spring locks into retaining groove of Adjusting Screw.



**ILLUSTRATION G**

- E. Attempt to remove Gripping Pad from the Adjusting Screw by hand. Gripping pad should move approximately 1/16" as the Spring compresses. If the Gripping Pad can be removed by hand, either the Spring is not properly seated or the Gripping Pad or Adjusting Screw retaining groove is worn beyond acceptable limit.
- F. Check Gripping Pad for proper operation. The Gripping Pad must rotate freely in the Adjusting Screw and swivel three (3) degrees in all directions. Spring must return Gripping Pad to "CENTERED" position when deflected.

**WARNING: If the Gripping Pad can be removed by hand or if the Spring does not center the Gripping Pad, remove clamp from service until the unit has been properly refurbished.**

Step 14.

ADJUSTING SCREW NMBL-14

- A. Inspect for distortions, damaged thread or wear.
- B. Inspect for fractures, particularly in the area where the Gripping Pad mounts, and on the opposite end where a hex shape and a hole is provided for a torque wrench and round bar.
- C. Inspect the internal wave spring retaining groove. Groove must be free of displaced metal, worn edges and foreign matter.

**WARNING: Replace Adjusting Screws that bent, have distorted or worn threads, contain fractures or have worn retaining spring groove.**

Step 15.

ASSEMBLY

After reassembly, check operation of clamp. All parts should move freely without binding. Refer to the drawing of the clamp for identification and proper location of component parts.

**WARNING: All fasteners, retaining pins and rings must be in place and installed properly.**



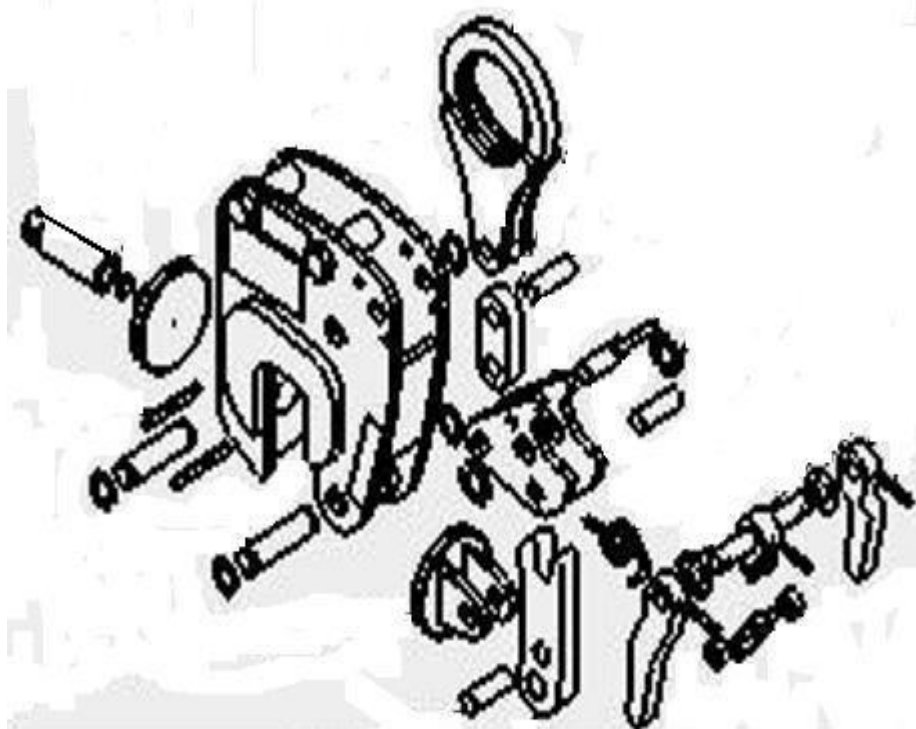
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## GENERAL

RENFROE products may be returned to the factory for inspection and refurbishment in accordance with an established fee schedule.

Use only RENFROE replacement parts to insure maximum efficiency of the product. Refer to RENFROE catalog for instructions on ordering replacement parts.

**WARNING: Do not weld, grind or modify the clamp or component parts in any manner. In the event the stenciling is worn and not legible, or the tag containing the model, capacity or other pertinent information is missing, do not use the clamp until it has been properly labeled. RENFROE will replace tags at no charge upon request.**



**EXCLUSION OF WARRANTY**

**THERE EXISTS NO WARRANTIES NEITHER EXPRESSED NOR IMPLIED WHICH EXTEND BEYOND THE DESCRIPTIONS OR STATEMENTS CONTAINED IN THE FACE OR ANY PART HEREOF.**



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