

WARNING:

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



RENFROE



Model RSCNM 300 lb. Capacity Clamp

Application, Operation and Maintenance Manual

OM 711-NMRSC



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, INCORPORATED

Jacksonville, Florida 32201
Telephone: 904/356-4181
Toll Free: 1-800-874-8454
Fax: 904/354-7865
www.jcrenfroe.com

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.

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.

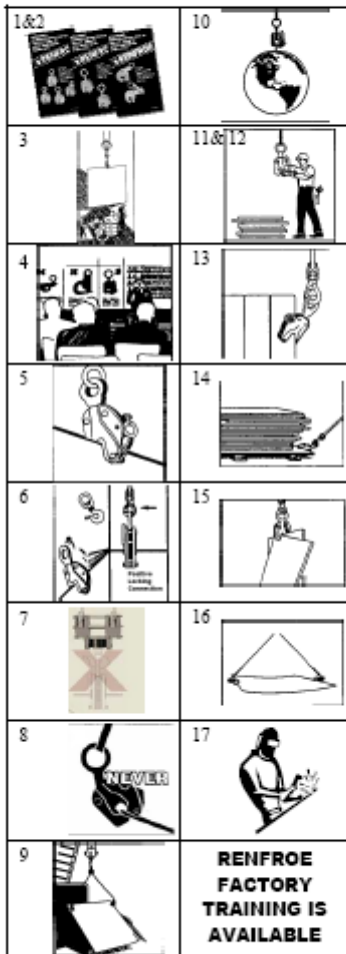
NOTICE OF EXCLUSION OF WARRANTY

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 Operators 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.
P.O. BOX 4279 / 1926 SPEARING STREET / JACKSONVILLE, FL. 32201

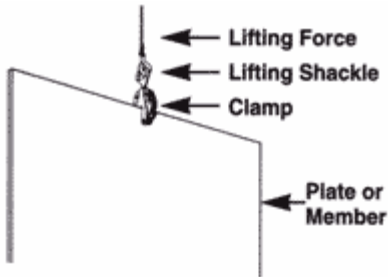
Phone: 904-356-4181
Facsimile: 904-354-7965
Internet: www.jrenfro.com
E-Mail: sales@jrenfro.com

OPERATING AIDS (DO'S AND DON'TS)

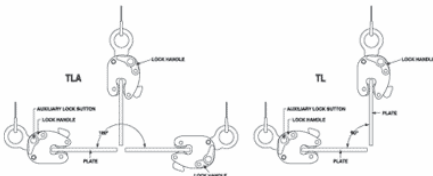
1. DO Consult Operator's Manual or RENFROE when in doubt. RENFROE factory representatives are available upon request at no charge to train and assist in establishing the proper use of RENFROE products.
2. DO Lock clamp closed before lifting load. NEVER lift with lock in open or "Lock Open" position.
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

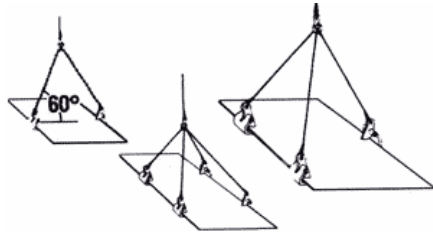
VERTICAL LIFT: The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



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°) arc and back to vertical thru the same ninety degree (90°) arc or from horizontal to vertical to horizontal thru a one hundred and eighty degree (180°) 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°). See illustration below. Sling angles less than sixty degrees (60°) 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 surfaces 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 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

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.

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.

MODEL NMRSC

ROTATING SCREW CLAMP



APPLICATION NMRSC

The Model NMRSC Clamp (non-marring screw clamp) is manufactured with smooth gripping surfaces to prevent marring when gripping stainless steel, copper, aluminum and other polished plates. The clamp is a vertical lift clamp capable of lift and turn operations from the horizontal through 180 degree arc. Refer to Illustration A next page. Side loading is limited to 10 degrees from the vertical axis. Refer to additional instructions in the Operations Section. The adjusting screw is used to accommodate various thicknesses of material and to facilitate attachment of the clamp to the member to be lifted. Refer to Definitions Pages for explanation of “Locking Screw” clamp. For identification of component parts, refer to the detail drawings of the clamp at the end of the Maintenance Section. Due to the variety of conditions that may exist in the handling of plates, it is recommended that the clamps be used in pairs and attached to a chain or wire rope sling, supported by a spreader beam. Refer to illustrations on the next page. The NMRSC is not intended for use in transporting of plates using mobile equipment where shock loading may be severe.

WARNING: Refer to the sections on Operation and Maintenance for the approved procedure in the Operation and Maintenance of this product.

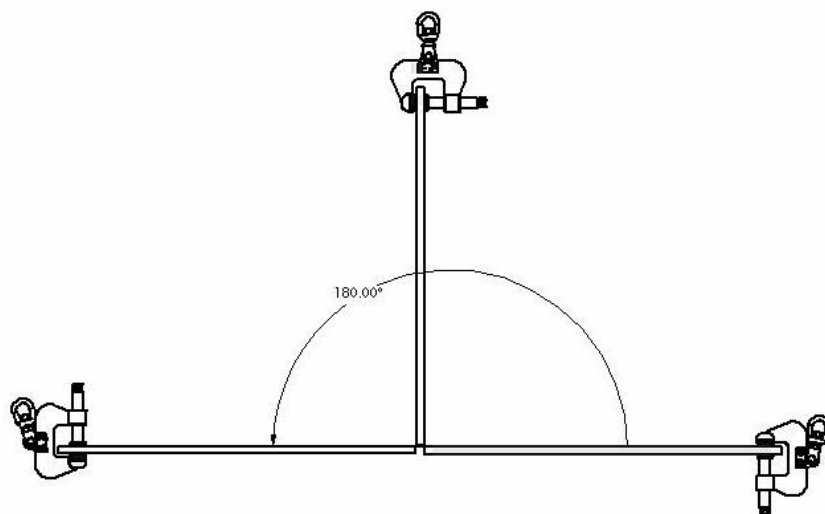
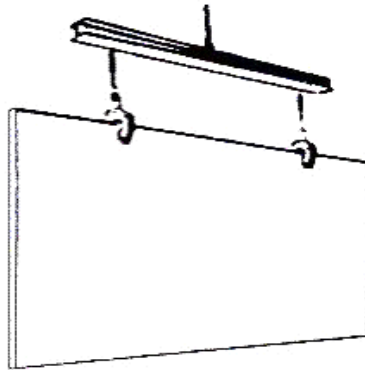
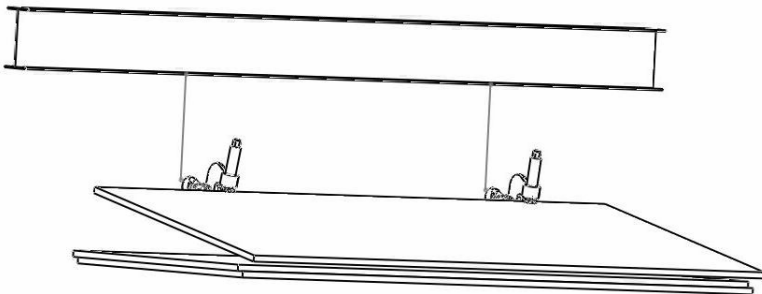


Illustration A



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



Recommended for use in pairs

OPERATION

Step 1.

Before using any RENFROE clamp, refer to the Application Section to confirm that the operation to be undertaken is an appropriate application for this product.

Step 2.

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

WARNING: Never exceed rated capacity or use on a member whose thickness is not within the range of the jaw opening stenciled on the clamp. Lift only one member on each lift.

Step 3.

Inspect each clamp before each use.

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

If in doubt, refer to the Maintenance Section for detailed maintenance instructions and detailed drawings for clamp 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. Gripping surfaces must be sharp and free of foreign matter. The screw cup and swivel jaw should turn freely. Set screw must not protrude from either the screw cup pad or the swivel jaw pad.
- D. Screw should turn freely. Inspect for wear and damage. Internal springs must hold swivel jaw and screw cup in "Centered" position with the gripping surfaces at 90 degrees to the length of the screw.

WARNING: Do not use clamp unless springs are in place and are holding the swivel jaw pad and screw cup pad at 90 degrees to the length of the screw.

-
- D. Inspect condition of the body for wear and damage, particularly on the inside of the jaw opening.
 - E. Inspect condition of the lifting shackle and shackle screw for wear and damage. Shackle yoke must pivot freely about the shackle screw. Shackle eye must rotate freely about the shackle yoke.
 - F. Remove from service any clamp in need of repair.

Step 4.

The clamp is a component of the rigging used in the lifting and transporting of members. It is important to use safe and adequate rigging.

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

Step 5.

Position clamp on the member to be lifted. Do not allow inside of the jaw opening to rest on the member to be lifted. Maintain 1/4" clearance. Refer to Illustration C on the following page.

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

WARNING: On Model NMRSC never exceed ten degrees side loading.

Refer to Illustrations D and E on the following pages.

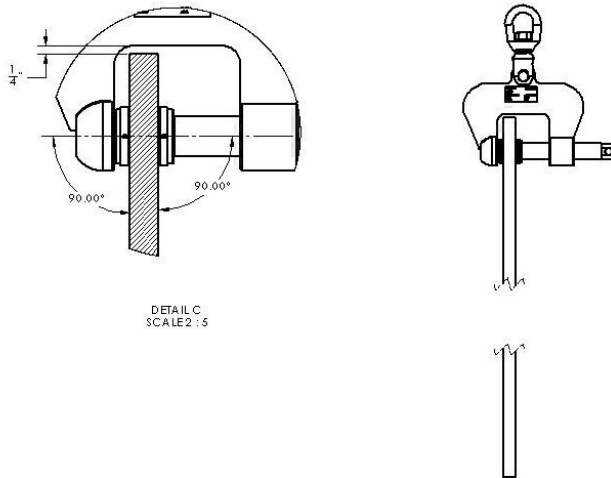


Illustration C

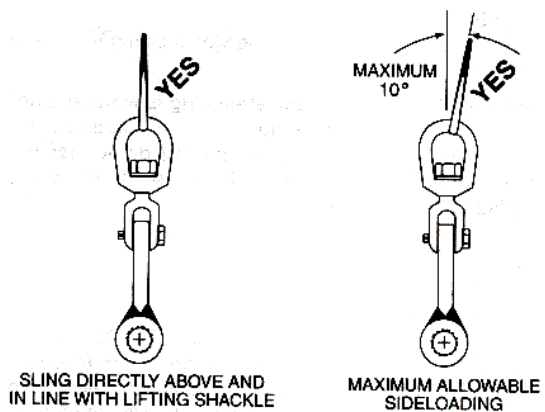


Illustration D

Step 6.
Tighten screw making certain that both gripping surfaces are parallel to the surface of the member being lifted and are not partially on and off the edge of the member. Refer to Illustration

Tighten the screw to an empirically determined torque value for the material being lifted.

WARNING: Apply required torque on screw. . The torque value for this model RSCNM clamp fitted with 1" diameter steel pads is 21 FT-LBS for lifting 300 lbs of dry and oil free steel plate.

Step 7.
Commence lift.

WARNING: The operator should position himself away from and fully clear of the member to be lifted.

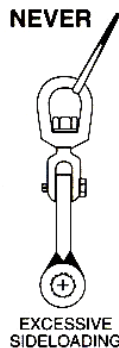


Illustration E

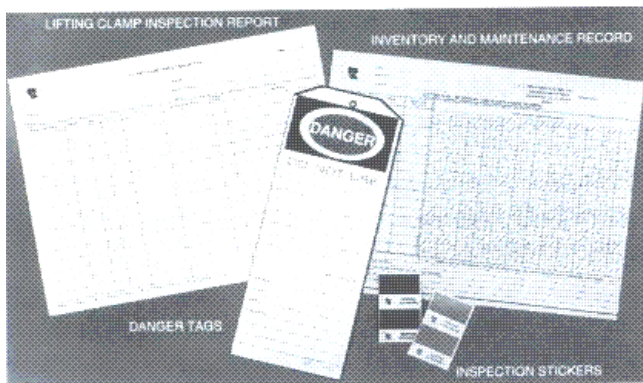
Do not commence lift until all personnel are clear of the area of the lift. Never stand under or near a member being lifted. Do not permit the member being lifted to contact adjacent structures or equipment.

Step 8.
To remove clamp (after load is fully supported and at rest in a stable position) relax lifting force and loosen screw. Lift clamp from plate.

Step 9
Inspect clamp. Remove from service if clamp is in need of repair.

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

Inspection Kits are available at no charge by request from a 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 Repair Kits containing all parts generally replaced due to normal wear.

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. Gripping surfaces must be smooth and free of foreign matter. The screw cup and swivel jaw should turn freely. Set screw must not protrude from either the screw cup pad or the swivel jaw pad.
- Screw should turn freely. Inspect for wear and damage. Internal springs must hold swivel jaw and screw cup in "Centered" position with the gripping surfaces at 90 degrees to the length of the screw.
- Inspect the condition of the body for wear, damage and distortion, particularly in the area of the jaw opening.
- Inspect condition of the lifting shackle and shackle screw for wear and damage. Shackle yoke must pivot freely about the shackle screw. Shackle eye must rotate freely about the shackle yoke.

Remove any clamp from service in need of repair.

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 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.

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

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)**

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, and other matter that may inhibit proper inspection of the clamp body or clamp 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, wear and distortion.
- C. Inspect surfaces of the body plate that come into contact with the shackle yoke for wear, damage or distortion.
- D. Inspect shackle screw hole for wear and elongation.
- E. Inspect inside of swivel jaw block for displaced metal, fractures, or distortion. Inspect condition of wave spring retaining groove. Groove must be free of displaced metal, foreign matter or worn edges.
- F. Inspect inside of screw block for worn threads, fractures, and displaced metal.

WARNING: Replace clamps containing fractures, elongated holes, distorted jaw openings, distorted and worn threads, jaw openings with displaced metal, or damaged spring retaining grooves.

Step 5.

SCREW

- A. Inspect for distortion, damaged threads and wear.
- B. Inspect for fractures, particularly in the area where the screw cup mounts and on the opposite end where the hole is provided for the handle.

-
- C. Inspect the wave spring retaining groove. Groove must be free of displaced metal, worn edges and foreign matter.

WARNING: Replace screws that are bent, have distorted and worn threads, contain fractures, or have worn retaining spring grooves.

Step 6.

SCREW CUP

- A. To remove screw cup, tighten the internal set screw until the screw cup lifts free of the screw. Removal of the screw cup destroys the internal wave spring. The used spring must be discarded and replaced with a new unit.

WARNING: Discard used wave spring. Do not attempt to re-assemble clamp with old spring. Always install new wave spring after disassembly of screw cup.

- B. Inspect screw cup pads for fractures, damage, and wear and any imperfections and foreign matter. Retaining spring groove must be free of displaced metal, worn edges, or foreign matter.

WARNING: Replace worn, dull or damaged screw cup pads.

- C. To install screw cup pad, insert lubricant into the recess of the screw. The recommended lubricant is Molybdenum Disulfide grease. Install new wave spring into retaining groove of the screw cup. The spring must be fully retained in the groove width and centered about its axis. Lightly lubricate set screw threads with Molybdenum Disulfide grease. Install set screw. Set screw must be fully contained within the body of the screw cup and must not protrude from either side. Press screw cup pad into the screw recess until the wave spring locks into the screws retaining groove.
- D. Attempt to remove screw cup pad from the screw by hand. Screw cup pad should move approximately 1/16" as the spring compresses. If the screw cup pad can be removed by hand,

either the spring is not properly sealed or the screw cup or screw retaining groove is worn beyond acceptable limits.

- E. Check screw cup pad for proper operation. Screw cup must rotate freely in the screw and swivel 3 degrees in all directions. Spring must return screw to “centered” position when deflected.

WARNING: If screw cup pad can be removed by hand or if the spring does not center the screw cup, remove clamp from service until the unit is repaired.

Step 7.

SWIVEL JAW

- A. To remove swivel jaw pad, tighten internal set screw until the swivel jaw pad lifts free of the swivel block. Removal of the swivel jaw pad destroys the internal wave spring. The used wave spring must be discarded and replaced by a new unit.

WARNING: Discard used wave spring. Do not attempt to re-assemble clamp with old spring. Always install new wave spring after disassembly of swivel jaw pad.

- B. Inspect swivel jaw pad for fractures, damage and wear imperfections and foreign matter. Retaining spring groove must be free of displaced metal, worn edges, and foreign matter.

WARNING: Replace worn, dull or damaged swivel jaw pads.

- C. To install swivel jaw pad, insert lubricant into the recess of the swivel block. The recommended lubricant is Molybdenum Disulfide grease. Install new wave spring into retaining groove of the swivel jaw pad. The spring must be fully retained in the groove width and centered about its axis. Lightly lubricate set screw threads with Molybdenum Disulfide grease. Install set screw. Set screw must be fully contained within the body of the swivel jaw pad and not protrude from either side. Press the swivel jaw pad into the swivel blocks spring retaining groove.

-
- D. Attempt to remove swivel jaw pad from swivel block by hand. Swivel jaw should move approximately 1/16" as the spring compresses. If the swivel jaw pad can be removed by hand, either the spring is not properly seated or the swivel jaw pad and/or swivel block retaining groove is worn beyond acceptable limits.
- E. Check swivel jaw pad for proper operation. Swivel jaw pad must rotate freely in the swivel block and swivel 5 degrees in all directions. Spring must return swivel jaw pad to the "centered" position when it is deflected.

WARNING: It swivel jaw pad can be removed from the swivel block by hand or if the spring does not center the swivel jaw pad, remove clamp from service until the unit is properly repaired.

Step 8.

SHACKLE SCREW

- A. Inspect shackle screw for distortion, surface blemishes, wear and fractures.

WARNING: Replace shackle screw that is distorted, bent, has surface scars, is worn, or contains fractures.

Step 9.

HANDLE ASSEMBLY

- A. Inspect handle for distortion or damage.
- B. Make certain that the retaining spiral pins are installed evenly and do not protrude out from either side of the handle collars.

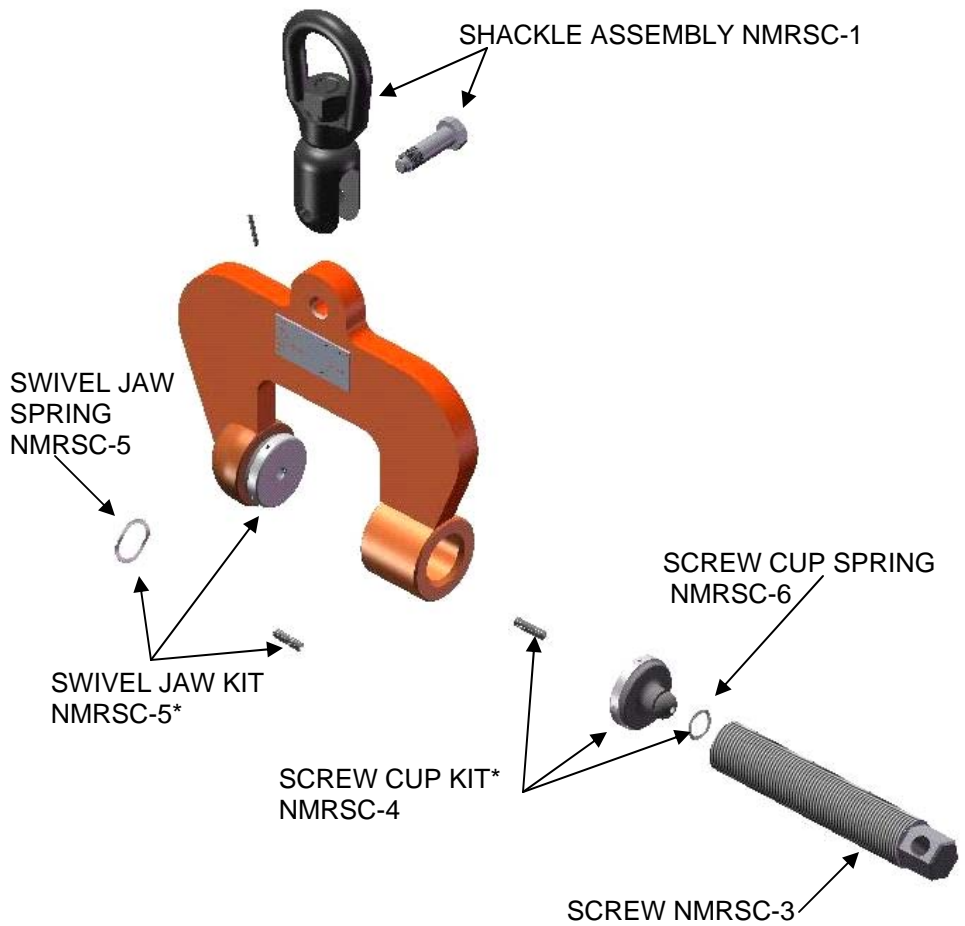
WARNING: Replace handles that are bent, distorted, or worn.

Step 10.

ASSEMBLY

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

WARNING: All retaining pins, screw, and springs must be in place before returning clamp to service.



EXCLUSION OF WARRANTY

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



J.C. RENFROE & SONS, INC.

P.O. Box 4279 • 1926 Spearing Street • Jacksonville, Florida 32206
Phone: U.S.A. Toll Free (800) 874-8454 - 904/356-4181
Facsimile: 904/354-7865 • Internet: www.jcrenfroe.com

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



RENFROE



Model NMRSC 1/2 Ton Clamp
Application, Operation and Maintenance Manual
OM 211-NMRSC



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,
INCORPORATED**

Jacksonville, Florida 32201
Telephone: 904/356-4181
Toll Free: 1-800-874-8454
Fax: 904/354-7865
www.jcrenfroe.com

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.

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.

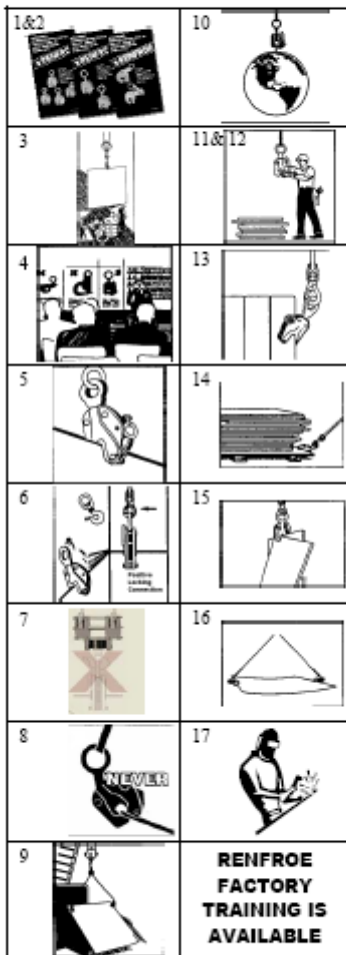
NOTICE OF EXCLUSION OF WARRANTY

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 Operators 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.
P.O. BOX 4279 / 1926 SPEARING STREET / JACKSONVILLE, FL. 32201

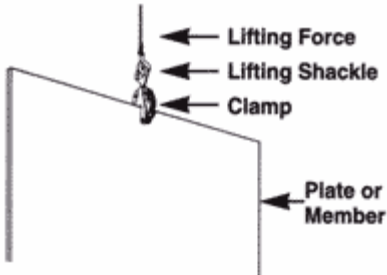
Phone: 904-356-4181
Facsimile: 904-354-7865
Internet: www.jrenfro.com
E-Mail: sales@jrenfro.com

OPERATING AIDS (DO'S AND DON'TS)

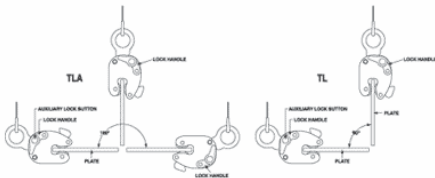
1. DO Consult Operator's Manual or RENFROE when in doubt. RENFROE factory representatives are available upon request at no charge to train and assist in establishing the proper use of RENFROE products.
2. DO Lock clamp closed before lifting load. NEVER lift with lock in open or "Lock Open" position.
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

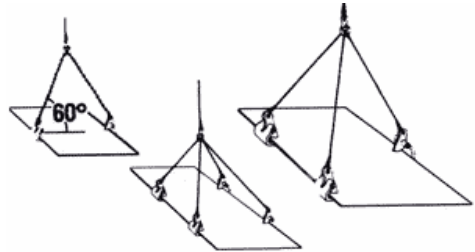
VERTICAL LIFT: The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



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°) arc and back to vertical thru the same ninety degree (90°) arc or from horizontal to vertical to horizontal thru a one hundred and eighty degree (180°) 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°). See illustration below. Sling angles less than sixty degrees (60°) 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-

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 overcenter 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 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.

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.

MODEL NMRSC

ROTATING SCREW CLAMP



APPLICATION NMRSC

The Model NMRSC Clamp (non-marring screw clamp) is manufactured with smooth gripping surfaces to prevent marring when gripping stainless steel, copper, aluminum and other polished plates. The clamp is a vertical lift clamp capable of lift and turn operations from the horizontal through 180 degree arc. The suspended load may also be rotated 360 degrees about the vertical axis. Refer to Illustrations A & B next page. Side loading is limited to 10 degrees from the vertical axis. Refer to additional instructions in the Operations Section. The adjusting screw is used to accommodate various thicknesses of material and to facilitate attachment of the clamp to the member to be lifted. Refer to Definitions Pages for explanation of “Locking Screw” clamp. For identification of component parts, refer to the detail drawings of the clamp at the end of the Maintenance Section. Due to the variety of conditions that may exist in the handling of plates, it is recommended that the clamps be used in pairs and attached to a chain or wire rope sling, supported by a spreader beam. Refer to illustrations on the next page. The NMRSC is not intended for use in transporting of plates using mobile equipment where shock loading may be severe.

WARNING: Refer to the sections on Operation and Maintenance for the approved procedure in the Operation and Maintenance of this product.

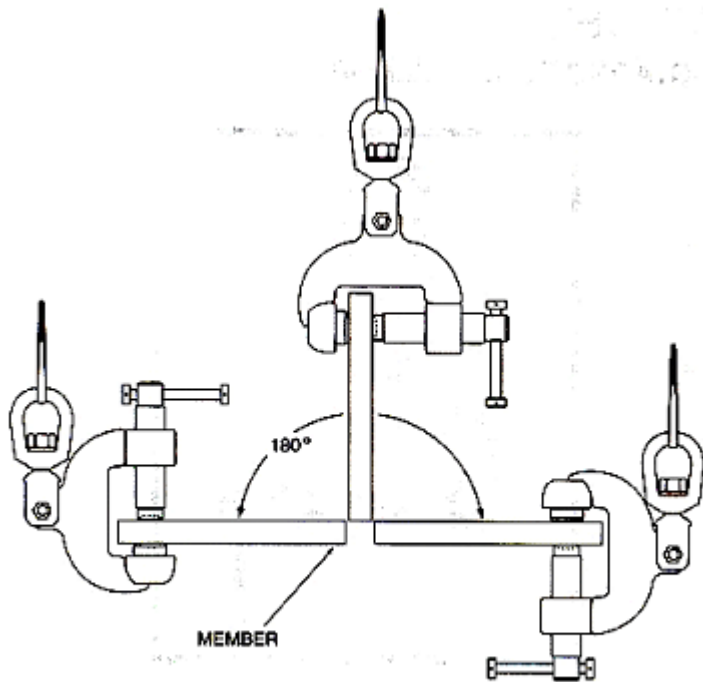
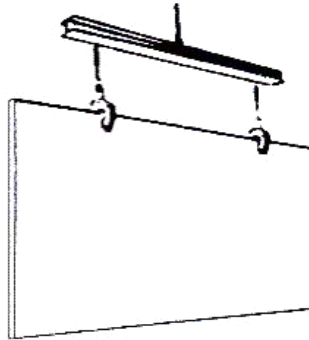
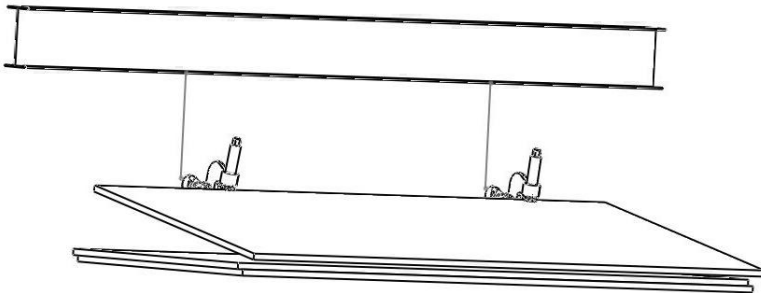


Illustration A



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



Recommended for use in pairs

OPERATION

Step 1.

Before using any RENFROE clamp, refer to the Application Section to confirm that the operation to be undertaken is an appropriate application for this product.

Step 2.

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

WARNING: Never exceed rated capacity or use on a member whose thickness is not within the range of the jaw opening stenciled on the clamp. Lift only one member on each lift.

Step 3.

Inspect each clamp before each use.

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

If in doubt, refer to the Maintenance Section for detailed maintenance instructions and detailed drawings for clamp 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. Gripping surfaces must be smooth and free of foreign matter. The screw cup and swivel jaw should turn freely. Set screw must not protrude from either the screw cup pad or the swivel jaw pad.
- D. Screw should turn freely. Inspect for wear and damage. Internal springs must hold swivel jaw and screw cup in "Centered" position with the gripping surfaces at 90 degrees to the length of the screw.

WARNING: Do not use clamp unless springs are in place and are holding the swivel jaw pad and screw cup pad at 90 degrees to the length of the screw.

-
- D. Inspect condition of the body for wear and damage, particularly on the inside of the jaw opening.
 - E. Inspect condition of the lifting shackle and shackle screw for wear and damage. Shackle yoke must pivot freely about the shackle screw. Shackle eye must rotate freely about the shackle yoke.

Remove from service any clamp in need of repair.

Step 4.

The clamp is a component of the rigging used in the lifting and transporting of members. It is important to use safe and adequate rigging.

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

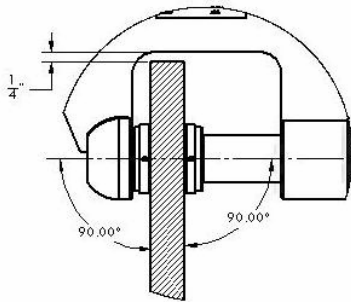
Step 5.

Position clamp on the member to be lifted. Do not allow inside of the jaw opening to rest on the member to be lifted. Maintain 1/4" clearance. Refer to Illustration C on the following page.

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

WARNING: On Model NMRSC never exceed ten degrees side loading.

Refer to Illustrations D and E on the following pages.



DETAIL C
SCALE 2 : 5

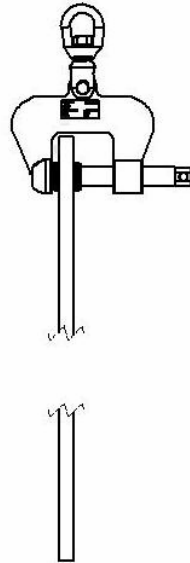


Illustration C

Step 6.

Tighten screw making certain that both gripping surfaces are parallel to the surface of the member being lifted and are not partially on and off the edge of the member. Refer to Illustration C.

The torque value for this model NMRSC clamp fitted with 2" diameter steel pads is 65FT-LBS for lifting 1000 lbs of dry and oil free steel plate.

WARNING: Apply required torque on screw. . The torque value for this model NMRSC clamp fitted with 2" diameter steel pads is 65 FT-LBS for lifting 1000 lbs of dry and oil free steel plate.

Step 7.
Commence lift.

WARNING: The operator should position himself away from and fully clear of the member to be lifted.

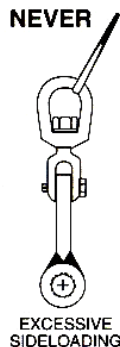


Illustration E

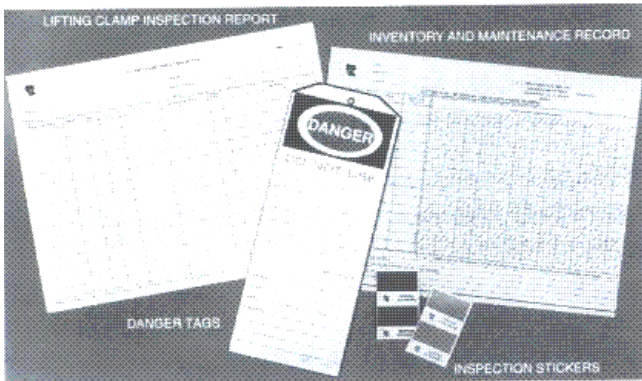
Do not commence lift until all personnel are clear of the area of the lift. Never stand under or near a member being lifted. Do not permit the member being lifted to contact adjacent structures or equipment.

Step 8.
To remove clamp (after load is fully supported and at rest in a stable position) relax lifting force and loosen screw. Lift clamp from plate.

Step 9
Inspect clamp. Remove from service if clamp is in need of repair.

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

Inspection Kits are available at no charge by request from a 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 Repair Kits containing all parts generally replaced due to normal wear.

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. Gripping surfaces must be smooth and free of foreign matter. The screw cup and swivel jaw should turn freely. Set screw must not protrude from either the screw cup pad or the swivel jaw pad.
- Screw should turn freely. Inspect for wear and damage. Internal springs must hold swivel jaw and screw cup in “Centered” position with the gripping surfaces at 90 degrees to the length of the screw.
- Inspect the condition of the body for wear, damage and distortion, particularly in the area of the jaw opening.
- Inspect condition of the lifting shackle and shackle screw for wear and damage. Shackle yoke must pivot freely about the shackle screw. Shackle eye must rotate freely about the shackle yoke.

Remove any clamp from service in need of repair.

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 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.

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

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)**

Model NMRSC 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 Renfroe factory for instructions on returning the clamp for recertification

Step 2.

Completely disassemble clamp.

Step 3.

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

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 surfaces of the body plate that come into contact with the shackle yoke for wear, damage or distortion.
- C. Inspect shackle screw hole for wear and elongation.
- D. Inspect inside of swivel jaw block for displaced metal, fractures, or distortion. Inspect condition of wave spring retaining groove. Groove must be free of displaced metal, foreign matter or worn edges.
- E. Inspect inside of screw block for worn threads, fractures, and displaced metal.

WARNING: Replace clamps containing fractures, elongated holes, distorted jaw openings, distorted and worn threads, jaw openings with displaced metal, or damaged spring retaining grooves.

Step 4.

SCREW

- A. Inspect for distortion, damaged threads and wear.
- B. Inspect for fractures, particularly in the area where the screw cup mounts and on the opposite end where the hole is provided for the handle.

-
- C. Inspect the wave spring retaining groove. Groove must be free of displaced metal, worn edges and foreign matter.

WARNING: Replace screws that are bent, have distorted and worn threads, contain fractures, or have worn retaining spring grooves.

Step 5.

SCREW CUP

- A. To remove screw cup, tighten the internal set screw until the screw cup lifts free of the screw. Removal of the screw cup destroys the internal wave spring. The used spring must be discarded and replaced with a new unit.

WARNING: Discard used wave spring. Do not attempt to reassemble clamp with old spring. Always install new wave spring after disassembly of screw cup.

- B. Inspect screw cup pads for fractures, damage, and wear and any imperfections and foreign matter. Retaining spring groove must be free of displaced metal, worn edges, or foreign matter.

WARNING: Replace worn, dull or damaged screw cup pads.

- C. To install screw cup pad, insert lubricant into the recess of the screw. The recommended lubricant is Molybdenum Disulfide grease. Install new wave spring into retaining groove of the screw cup. The spring must be fully retained in the groove width and centered about its axis. Lightly lubricate set screw threads with Molybdenum Disulfide grease. Install set screw. Set screw must be fully contained within the body of the screw cup and must not protrude from either side. Press screw cup pad into the screw recess until the wave spring locks into the screws retaining groove.
- D. Attempt to remove screw cup pad from the screw by hand. Screw cup pad should move approximately 1/16" as the spring compresses. If the screw cup pad can be removed by hand,

either the spring is not properly seated or the screw cup or screw retaining groove is worn beyond acceptable limits.

- E. Check screw cup pad for proper operation. Screw cup must rotate freely in the screw and swivel 3 degrees in all directions. Spring must return screw to “centered” position when deflected.

WARNING: If screw cup pad can be removed by hand or if the spring does not center the screw cup, remove clamp from service until the unit is repaired.

Step 6.

SWIVEL JAW

- A. To remove swivel jaw pad, tighten internal set screw until the swivel jaw pad lifts free of the swivel block. Removal of the swivel jaw pad destroys the internal wave spring. The used wave spring must be discarded and replaced by a new unit.

WARNING: Discard used wave spring. Do not attempt to reassemble clamp with old spring. Always install new wave spring after disassembly of swivel jaw pad.

- B. Inspect swivel jaw pad for fractures, damage and wear imperfections and foreign matter. Retaining spring groove must be free of displaced metal, worn edges, and foreign matter.

WARNING: Replace worn, dull or damaged swivel jaw pads.

- C. To install swivel jaw pad, insert lubricant into the recess of the swivel block. The recommended lubricant is Molybdenum Disulfide grease. Install new wave spring into retaining groove of the swivel jaw pad. The spring must be fully retained in the groove width and centered about its axis. Lightly lubricate set screw threads with Molybdenum Disulfide grease. Install set screw. Set screw must be fully contained within the body of the swivel jaw pad and not protrude from either side. Press the swivel jaw pad into the swivel blocks spring retaining groove.

-
- D. Attempt to remove swivel jaw pad from swivel block by hand. Swivel jaw should move approximately 1/16" as the spring compresses. If the swivel jaw pad can be removed by hand, either the spring is not properly seated or the swivel jaw pad and/or swivel block retaining groove is worn beyond acceptable limits.
 - E. Check swivel jaw pad for proper operation. Swivel jaw pad must rotate freely in the swivel block and swivel 5 degrees in all directions. Spring must return swivel jaw pad to the "centered" position when it is deflected.

WARNING: It swivel jaw pad can be removed from the swivel block by hand or if the spring does not center the swivel jaw pad, remove clamp from service until the unit is properly repaired.

Step 7.

SHACKLE SCREW

- A. Inspect shackle screw for distortion, surface blemishes, wear and fractures.

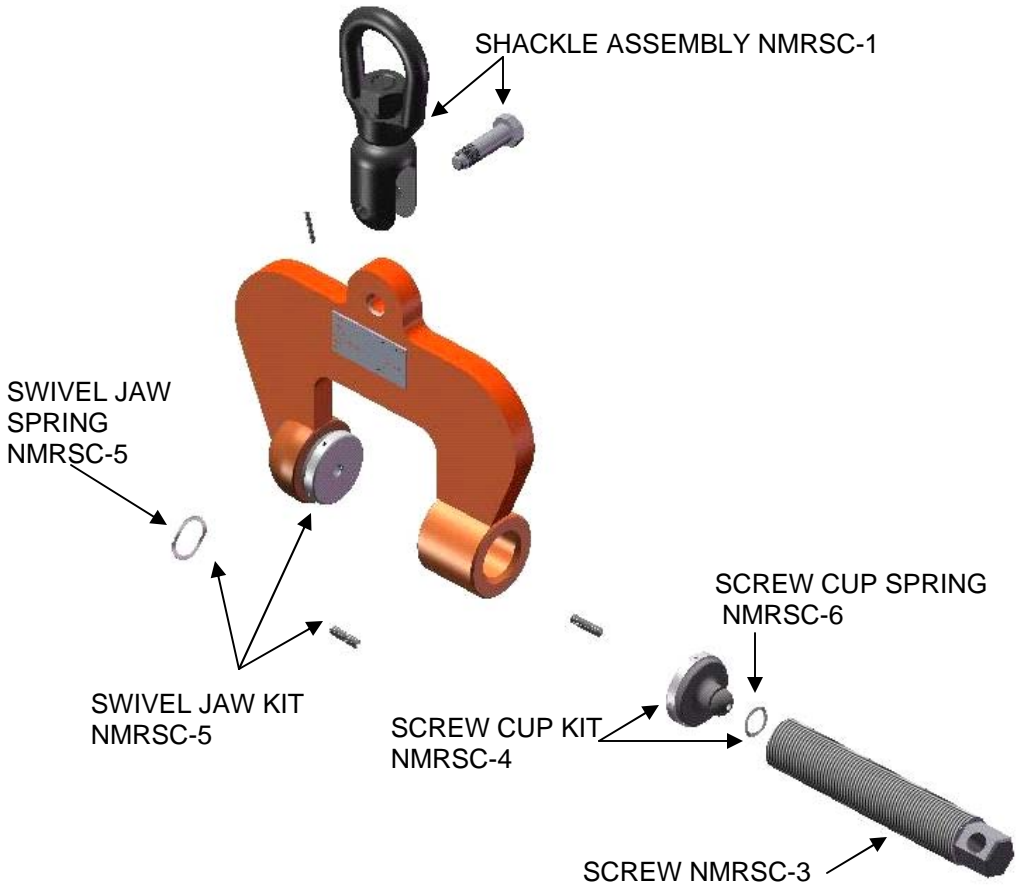
WARNING: Replace shackle screw that is distorted, bent, has surface scars, is worn, or contains fractures.

Step 8.

ASSEMBLY

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

WARNING: All retaining pins, screw, and springs must be in place before returning clamp to service.



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.



J.C. RENFROE & SONS, INC.

P.O. Box 4279 • 1926 Spearing Street • Jacksonville, Florida 32206
Phone: U.S.A. Toll Free (800) 874-8454 - 904/356-4181
Facsimile: 904/354-7865 • Internet: www.jcrenfroe.com

WARNING:

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



RENFROE



Model NMRSC 2 Ton Capacity Clamp

Application, Operation and Maintenance Manual

OM 711-NMRSC



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, INCORPORATED

Jacksonville, Florida 32201
Telephone: 904/356-4181
Toll Free: 1-800-874-8454
Fax: 904/354-7865
www.jcrenfroe.com

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.

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.

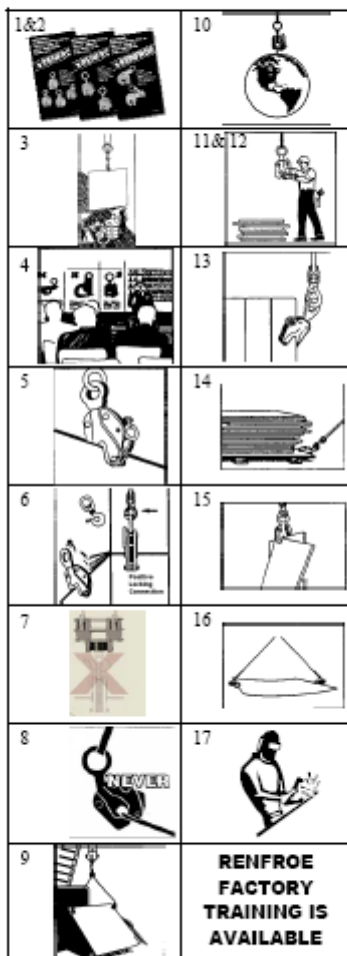
NOTICE OF EXCLUSION OF WARRANTY

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)

- DO read and understand the operator's manual before using clamp.
- DO consult Operators Manual or RENFROE when in doubt.
- DON'T lift over workmen. DON'T lift over safety areas or personnel.
- DO attend a factory training class for establishing proper use of Renfro Products.
- DO Lock clamp closed when clamps are fitted with a lock. DON'T lift with lock in open or "lock open" position.
- DON'T use a connection that may release the clamp.
- 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.
- DO use correct clamp for job. DON'T use large capacity clamps to lift light loads.
- DO use an adequate number of clamps to balance load. DON'T lift loads that are not balanced.
- DO use clamps within their rated capacity. DON'T overload clamps.
- 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.
- DON'T use clamp that has been overloaded. DO refer to pre-lift inspection in Operator's Manual.
- DON'T side load with a straight shackle clamp.
- DON'T misuse. DON'T lift plate from bottom of plate stack.
- DON'T rush. DON'T lift more than one plate at a time with a vertical clamp.
- DON'T improvise. Always use correct clamp for the job. DON'T lift plate horizontally with a vertical lift only clamp.
- DON'T alter clamp. DON'T grind, weld or modify the clamp in any manner.



J.C. RENFROE & SONS, INC.

P.O. BOX 4279 / 1926 SPEARING STREET / JACKSONVILLE, FL 32201

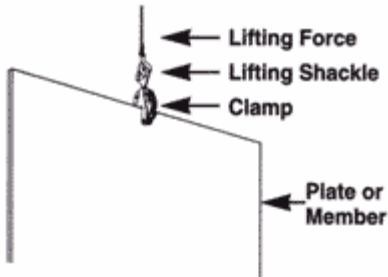
Phone: 904-356-4151
 Facsimile: 904-354-7805
 Internet: www.jorenfro.com
 E-Mail: sales@jorenfro.com

OPERATING AIDS (DO'S AND DON'TS)

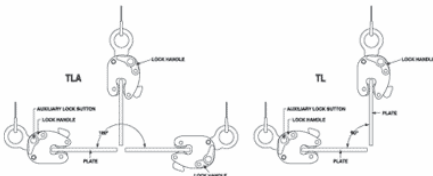
1. DO Consult Operator's Manual or RENFROE when in doubt. RENFROE factory representatives are available upon request at no charge to train and assist in establishing the proper use of RENFROE products.
2. DO Lock clamp closed before lifting load. NEVER lift with lock in open or "Lock Open" position.
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

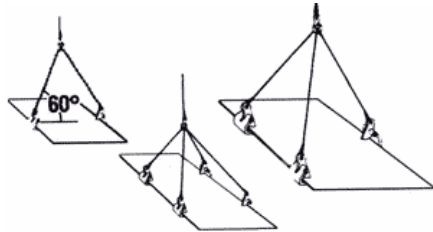
VERTICAL LIFT: The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



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°) arc and back to vertical thru the same ninety degree (90°) arc or from horizontal to vertical to horizontal thru a one hundred and eighty degree (180°) 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°). See illustration below. Sling angles less than sixty degrees (60°) 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 surfaces 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 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

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.

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.

MODEL NMRSC Rotating SCREW CLAMP



APPLICATION NMRSC

The Model RSCNM Clamp (non-marring screw clamp) is manufactured with smooth gripping surfaces to prevent marring when gripping stainless steel, copper, aluminum and other polished plates. The clamp is a vertical lift clamp capable of lift and turn operations from the horizontal through 180 degree arc. Refer to Illustration A next page. Side loading is limited to 10 degrees from the vertical axis. Refer to additional instructions in the Operations Section. The adjusting screw is used to accommodate various thicknesses of material and to facilitate attachment of the clamp to the member to be lifted. Refer to Definitions Pages for explanation of “Locking Screw” clamp. For identification of component parts, refer to the detail drawings of the clamp at the end of the Maintenance Section. Due to the variety of conditions that may exist in the handling of plates, it is recommended that the clamps be used in pairs and attached to a chain or wire rope sling, supported by a spreader beam. Refer to illustrations on the next page. The NMRSC is not intended for use in transporting of plates using mobile equipment where shock loading may be severe.

WARNING: Refer to the sections on Operation and Maintenance for the approved procedure in the Operation and Maintenance of this product.

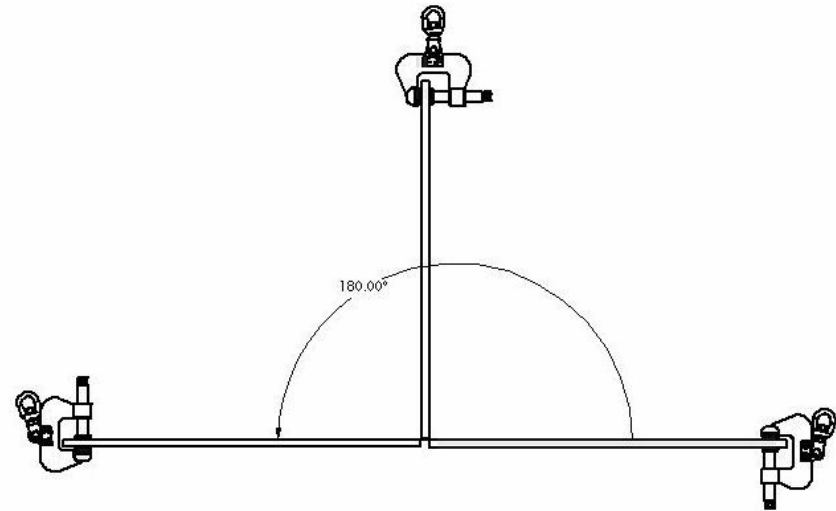
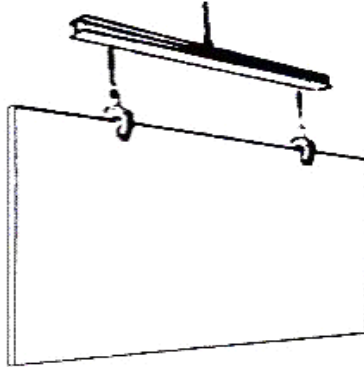
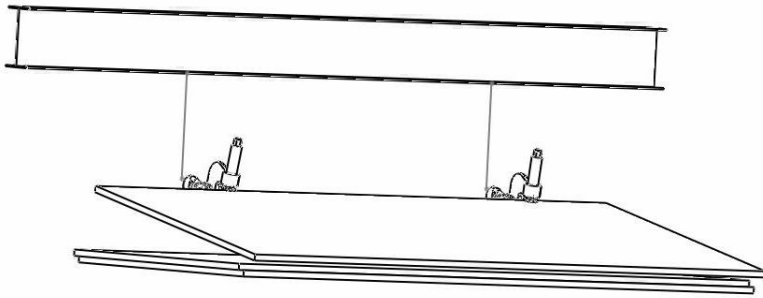


Illustration A



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



Recommended for use in pairs

OPERATION

Step 1.

Before using any RENFROE clamp, refer to the Application Section to confirm that the operation to be undertaken is an appropriate application for this product.

Step 2.

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

WARNING: Never exceed rated capacity or use on a member whose thickness is not within the range of the jaw opening stenciled on the clamp. Lift only one member on each lift.

Step 3.

Inspect each clamp before each use.

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

If in doubt, refer to the Maintenance Section for detailed maintenance instructions and detailed drawings for clamp 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. Gripping surfaces must be sharp and free of foreign matter. The screw cup and swivel jaw should turn freely. Set screw must not protrude from either the screw cup pad or the swivel jaw pad.
- D. Screw should turn freely. Inspect for wear and damage. Internal springs must hold swivel jaw and screw cup in "Centered" position with the gripping surfaces at 90 degrees to the length of the screw.

WARNING: Do not use clamp unless springs are in place and are holding the swivel jaw pad and screw cup pad at 90 degrees to the length of the screw.

-
- D. Inspect condition of the body for wear and damage, particularly on the inside of the jaw opening.
 - E. Inspect condition of the lifting shackle and shackle screw for wear and damage. Shackle yoke must pivot freely about the shackle screw. Shackle eye must rotate freely about the shackle yoke.
 - F. Remove from service any clamp in need of repair.

Step 4.

The clamp is a component of the rigging used in the lifting and transporting of members. It is important to use safe and adequate rigging.

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

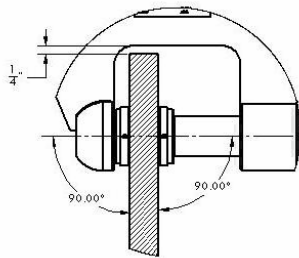
Step 5.

Position clamp on the member to be lifted. Do not allow inside of the jaw opening to rest on the member to be lifted. Maintain 1/4" clearance. Refer to Illustration C on the following page.

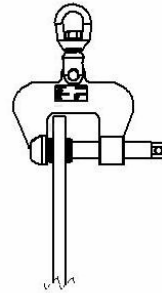
Position clamp such that the direction of force applied by the crane is in line with the lifting shackle.

WARNING: On Model NMRSC never exceed ten degrees side loading.

Refer to Illustrations D and E on the following pages.

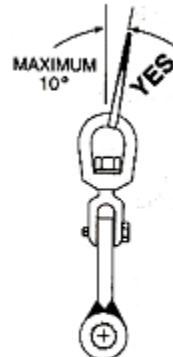


DETAIL C
SCALE 2:5



SLING DIRECTLY ABOVE AND
IN LINE WITH LIFTING SHACKLE

Illustration D



MAXIMUM ALLOWABLE
SIDELOADING

Step 6.

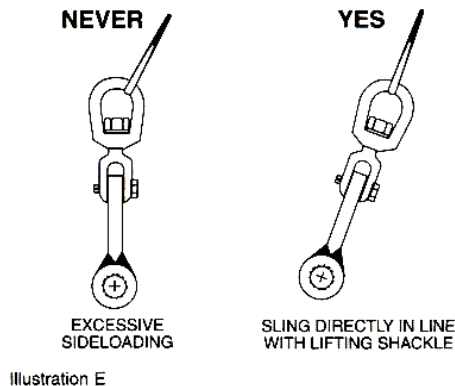
Tighten screw making certain that both gripping surfaces are parallel to the surface of the member being lifted and are not partially on and off the edge of the member. Refer to Illustration

Tighten the screw to an empirically determined torque value for the material being lifted.

WARNING: Apply required torque on screw. . The torque value for this model NMRSC clamp fitted with 2" diameter steel pads is 225 FT-LBS for lifting 4000 lbs of 350 BHN dry and oil free steel plate.

Step 7.
Commence lift.

WARNING: The operator should position himself away from and fully clear of the member to be lifted.



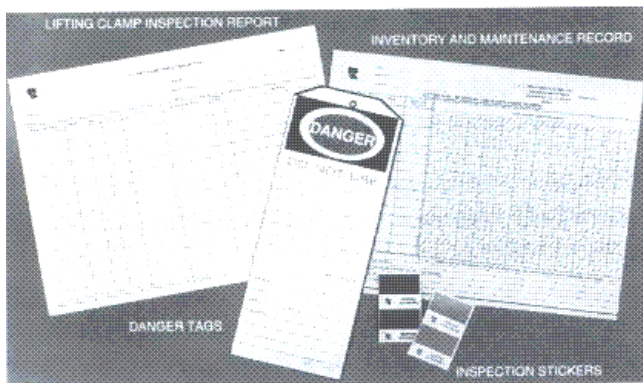
Do not commence lift until all personnel are clear of the area of the lift. Never stand under or near a member being lifted. Do not permit the member being lifted to contact adjacent structures or equipment.

Step 8.
To remove clamp (after load is fully supported and at rest in a stable position) relax lifting force and loosen screw. Lift clamp from plate.

Step 9
Inspect clamp. Remove from service if clamp is in need of repair.

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

Inspection Kits are available at no charge by request from a 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 Repair Kits containing all parts generally replaced due to normal wear.

Maintenance Program for Renfro 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. Renfro acknowledges the ASME B30.20 safety standard which sets forth minimum inspection requirements for "Below-the-Hook" lifting devices and the Renfro 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. Gripping surfaces must be smooth and free of foreign matter. The screw cup and swivel jaw should turn freely. Set screw must not protrude from either the screw cup pad or the swivel jaw pad.
- Screw should turn freely. Inspect for wear and damage. Internal springs must hold swivel jaw and screw cup in "Centered" position with the gripping surfaces at 90 degrees to the length of the screw.
- Inspect the condition of the body for wear, damage and distortion, particularly in the area of the jaw opening.
- Inspect condition of the lifting shackle and shackle screw for wear and damage. Shackle yoke must pivot freely about the shackle screw. Shackle eye must rotate freely about the shackle yoke.

Remove any clamp from service in need of repair.

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 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.

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

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)**

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, and other matter that may inhibit proper inspection of the clamp body or clamp 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, wear and distortion.
- C. Inspect surfaces of the body plate that come into contact with the shackle yoke for wear, damage or distortion.
- D. Inspect shackle screw hole for wear and elongation.
- E. Inspect inside of swivel jaw block for displaced metal, fractures, or distortion. Inspect condition of wave spring retaining groove. Groove must be free of displaced metal, foreign matter or worn edges.
- F. Inspect inside of screw block for worn threads, fractures, and displaced metal.

WARNING: Replace clamps containing fractures, elongated holes, distorted jaw openings, distorted and worn threads, jaw openings with displaced metal, or damaged spring retaining grooves.

Step 5.

SCREW

- A. Inspect for distortion, damaged threads and wear.
- B. Inspect for fractures, particularly in the area where the screw cup mounts and on the opposite end where the hole is provided for the handle.

-
- C. Inspect the wave spring retaining groove. Groove must be free of displaced metal, worn edges and foreign matter.

WARNING: Replace screws that are bent, have distorted and worn threads, contain fractures, or have worn retaining spring grooves.

Step 6.

SCREW CUP

- A. To remove screw cup, tighten the internal set screw until the screw cup lifts free of the screw. Removal of the screw cup destroys the internal wave spring. The used spring must be discarded and replaced with a new unit.

WARNING: Discard used wave spring. Do not attempt to re-assemble clamp with old spring. Always install new wave spring after disassembly of screw cup.

- B. Inspect screw cup pads for fractures, damage, and wear and any imperfections and foreign matter. Retaining spring groove must be free of displaced metal, worn edges, or foreign matter.

WARNING: Replace worn, dull or damaged screw cup pads.

- C. To install screw cup pad, insert lubricant into the recess of the screw. The recommended lubricant is Molybdenum Disulfide grease. Install new wave spring into retaining groove of the screw cup. The spring must be fully retained in the groove width and centered about its axis. Lightly lubricate set screw threads with Molybdenum Disulfide grease. Install set screw. Set screw must be fully contained within the body of the screw cup and must not protrude from either side. Press screw cup pad into the screw recess until the wave spring locks into the screws retaining groove.
- D. Attempt to remove screw cup pad from the screw by hand. Screw cup pad should move approximately 1/16" as the spring compresses. If the screw cup pad can be removed by hand,

either the spring is not properly sealed or the screw cup or screw retaining groove is worn beyond acceptable limits.

- E. Check screw cup pad for proper operation. Screw cup must rotate freely in the screw and swivel 3 degrees in all directions. Spring must return screw to “centered” position when deflected.

WARNING: If screw cup pad can be removed by hand or if the spring does not center the screw cup, remove clamp from service until the unit is repaired.

Step 7.

SWIVEL JAW

- A. To remove swivel jaw pad, tighten internal set screw until the swivel jaw pad lifts free of the swivel block. Removal of the swivel jaw pad destroys the internal wave spring. The used wave spring must be discarded and replaced by a new unit.

WARNING: Discard used wave spring. Do not attempt to re-assemble clamp with old spring. Always install new wave spring after disassembly of swivel jaw pad.

- B. Inspect swivel jaw pad for fractures, damage and wear imperfections and foreign matter. Retaining spring groove must be free of displaced metal, worn edges, and foreign matter.

WARNING: Replace worn, dull or damaged swivel jaw pads.

- C. To install swivel jaw pad, insert lubricant into the recess of the swivel block. The recommended lubricant is Molybdenum Disulfide grease. Install new wave spring into retaining groove of the swivel jaw pad. The spring must be fully retained in the groove width and centered about its axis. Lightly lubricate set screw threads with Molybdenum Disulfide grease. Install set screw. Set screw must be fully contained within the body of the swivel jaw pad and not protrude from either side. Press the swivel jaw pad into the swivel blocks spring retaining groove.

-
- D. Attempt to remove swivel jaw pad from swivel block by hand. Swivel jaw should move approximately 1/16" as the spring compresses. If the swivel jaw pad can be removed by hand, either the spring is not properly seated or the swivel jaw pad and/or swivel block retaining groove is worn beyond acceptable limits.
 - E. Check swivel jaw pad for proper operation. Swivel jaw pad must rotate freely in the swivel block and swivel 5 degrees in all directions. Spring must return swivel jaw pad to the "centered" position when it is deflected.

WARNING: It swivel jaw pad can be removed from the swivel block by hand or if the spring does not center the swivel jaw pad, remove clamp from service until the unit is properly repaired.

Step 8.

SHACKLE SCREW

- A. Inspect shackle screw for distortion, surface blemishes, wear and fractures.

WARNING: Replace shackle screw that is distorted, bent, has surface scars, is worn, or contains fractures.

Step 9.

HANDLE ASSEMBLY

- A. Inspect handle for distortion or damage.
- B. Make certain that the retaining spiral pins are installed evenly and do not protrude out from either side of the handle collars.

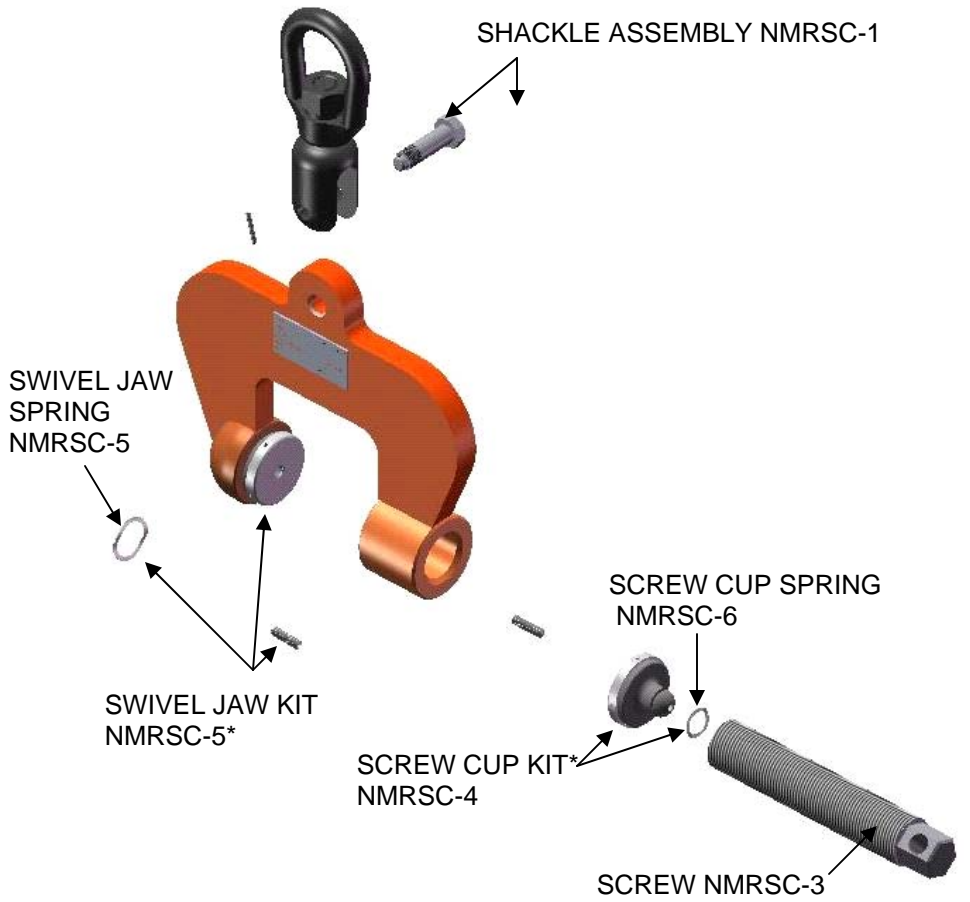
WARNING: Replace handles that are bent, distorted, or worn.

Step 10.

ASSEMBLY

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

WARNING: All retaining pins, screw, and springs must be in place before returning clamp to service.



EXCLUSION OF WARRANTY

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



J.C. RENFROE & SONS, INC.

P.O. Box 4279 • 1926 Spearing Street • Jacksonville, Florida 32206
Phone: U.S.A. Toll Free (800) 874-8454 - 904/356-4181
Facsimile: 904/354-7865 • Internet: www.jcrenfroe.com