

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



RENFROE



Model BD Clamp
Application, Operation and Maintenance Manual

OM 211-BD



Operators Manual

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

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

**J.C. RENFROE & SONS,
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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.

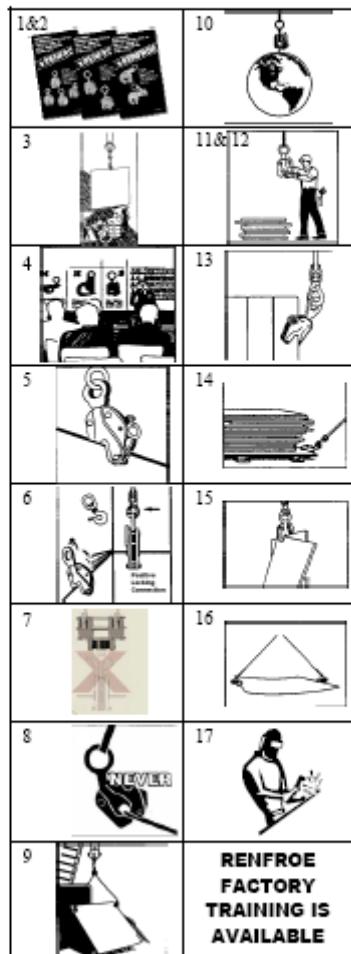
Failure to review and utilize recommended applications, operation and maintenance instructions may result in serious injury to operator and others.

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 Renfroe 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.



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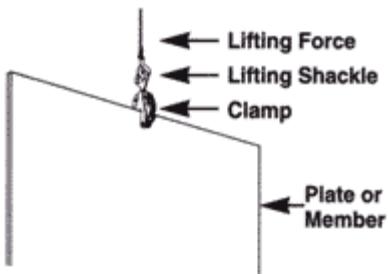
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OPERATING AIDS (DO'S AND DON'TS)

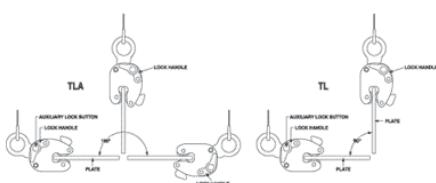
1. DO read and understand the Operators Manual before using the clamp
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DEFINITIONS

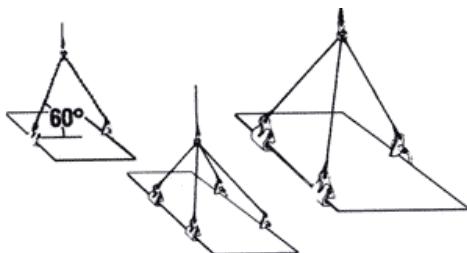
VERTICAL LIFT: The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



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 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.

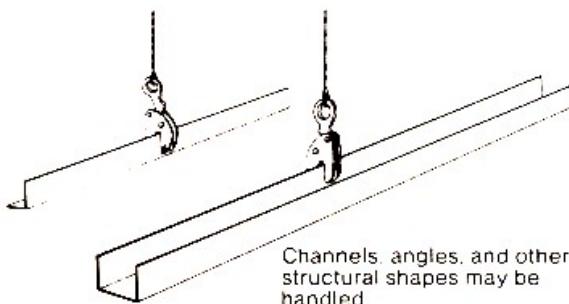
Model BD
Vertical
Non-Locking

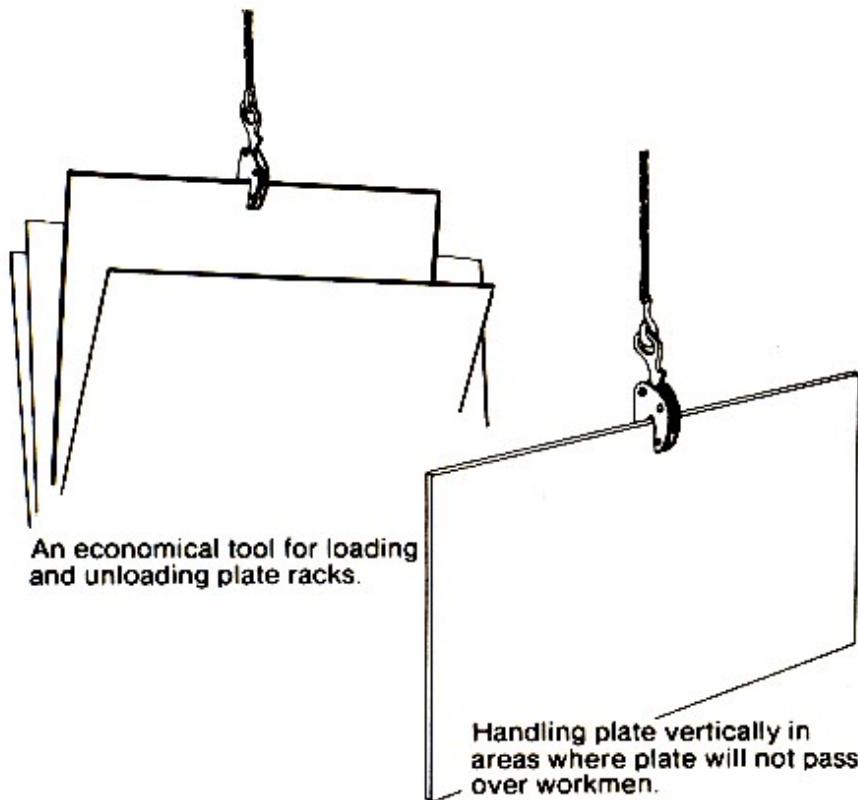


Application BD

The model “BD” is a vertical lifting clamp used primarily for steel warehousing and bench-work where a locking type clamp is not essential. Refer to Definition Pages for explanation of “Non-Locking” clamp. The clamp is a low-cost, low-maintenance tool that features lightweight and compact size. It is recommended for use and application where constant tension is applied to the lifting shackle throughout the entire operation. Refer to Illustrations shown below. Refer to exploded view of clamp located at the end of the Maintenance Section for identification of component parts.

WARNING: Do not use the Model “BD” for transporting plates from one area to another. Refer to the sections on operation and maintenance for the approved procedures in the operation and maintenance of this product.





OPERATION BD

Step 1.

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

Step 2.

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

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

Always use clamp with maximum plate thickness and rated capacity near equal to the thickness and weight of the plate being lifted.

Step 3.

Inspect clamp before each lift.

WARNING: Do not use if in need of repair.

If in doubt, refer to Maintenance Section for detailed maintenance instructions and exploded view of the clamp for part identification.

- A. Check the clamp to be certain the Identification and warning tags are present and legible.
- B. Do not use the clamp if the tags are missing or illegible
- C. Inspect gripping surfaces for wear and defects. Gripping surfaces must be sharp and free of foreign matter.
- D. Swivel jaw should turn freely. Inspect swivel jaw mounting hole in body for elongation indicating overload or excessive wear.
- E. Inspect condition of body for wear, damage and distortion, particularly in the area of the jaw opening.
- F. Inspect lifting shackle and all pins for wear and damage.
- G. Remove any clamp from service in need of repair.

Step 4.

The clamp is a component of the rigging used in the lifting or transporting of the plate. It is important to use safe and adequate rigging. The clamp is manually held in place until the gripping mechanism of the clamp is activated by a force applied to the lifting shackle.

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

Step 5.

Install clamp on plate. Maintain 1/4" clearance between inside of jaw opening and edge of plate. Make certain gripping surfaces are fully in contact with plate. Refer to Illustration A.

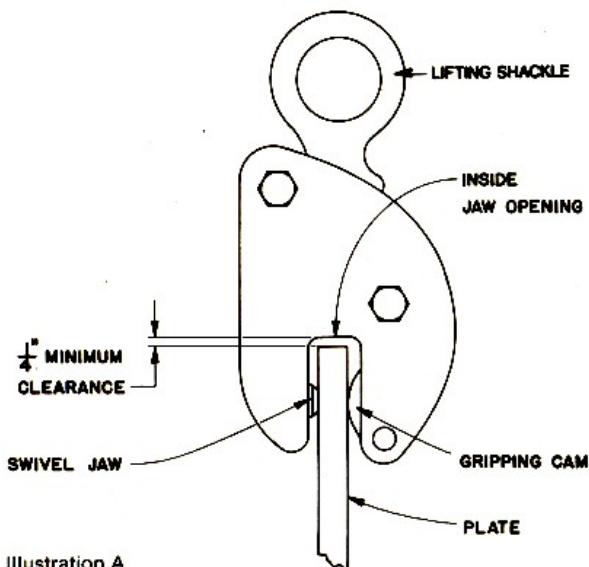


Illustration A

Step 6.

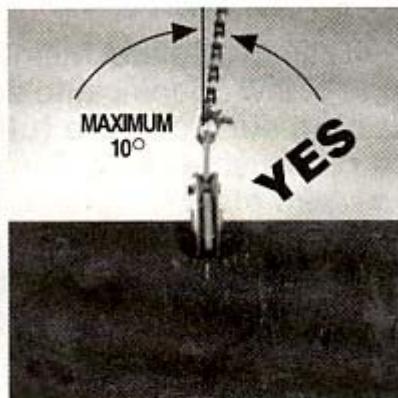
Position clamp so the direction of force applied by the crane is in line with lifting shackle. Make certain the swivel jaw and gripping cam are fully in contact with the plate and not partially on and off the edge of the plate.

WARNING: Never exceed 10 degrees side-loading.

Refer to Photographs B, C, D, E and F.



Photograph B (Typical) Sling directly above and in line with the lifting shackle.



Photograph C (Typical) Maximum allowable sideloading.



Photograph D (Typical)
Excessive sideloading.



Photograph E (Typical)
Clamps in line with the sling.



Photograph F (Typical)

Step 7.

Slowly apply tension to the lifting shackle until gripping surfaces of the clamp are in full contact and exerting a force on the plate. Refer to Photograph G.

WARNING: A constant force must be maintained on the lifting shackle throughout the entire operation.



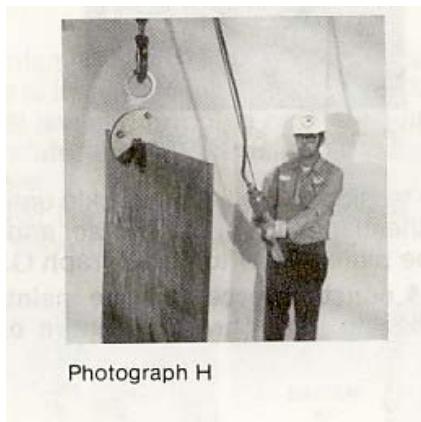
Photograph G

Step 8.

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.

Refer to Photograph H.



Photograph H

Step 9.

To remove clamp—after plate is fully supported and at rest in a stable position, relax lifting force and manually move gripping cam to “open” position by actuating the lifting shackle, remove clamp from plate.

Step 10.

Inspect clamp. Remove any clamp from service 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 clamp until it has been properly labeled.

Inspection kits are available at no charge upon request from the distributor or RENFROE. Kit contains:



RENFROE clamps are constructed so the wearing parts may be replaced by installing individual parts or 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.

- 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.
- D. Swivel jaw should turn freely. Inspect swivel jaw mounting hole in body for elongation indicating overload or excessive wear.
- E. Inspect condition of body for wear, damage and distortion, particularly in the area of the jaw opening.
- F. Inspect lifting shackle and all pins for wear and damage.

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

Periodic Inspection:

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

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

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

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

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 BD 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.

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 all pin holes for wear and elongation.
- C. Inspect inside area of jaw opening for displaced metal and distortion.
- D. Inspect swivel jaw mounting hole for elongation and wear. Swivel jaw must turn freely. Remove clamp body from service when swivel jaw mounting hole dimensions equal or exceed those listed below.

Rated Capacity Tons	Mounting Hole Dia. Inches	Mounting Hole Depth Inches
½	.905	.316
1	1.160	.426
2	1.160	.426
4	1.545	.520
7	1.790	.535

WARNING: Replace clamps containing fractures, elongated holes, worn and elongated swivel jaw mounting holes, distorted jaw opening and clamp bodies with metal in jaw opening displaced by excessive side-loading.

Step 5.

LIFTING SHACKLE BD-1

- A. Inspect shackle eye for elongation and wear at point where eye engages sling attachment.
- B. Inspect shackle pin hole for wear and elongation.
- C. Inspect shackle body for bending.

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

WARNING: Replace shackles that are bent, show excessive wear at eye and have elongated shackle pin holes.

Step 6.

SHACKLE PIN, FLOATING CAM PIN and CAM PIN BD-2, BD-7 and BD-9.

- A. Inspect all pins for the following:
 1. Distortion
 2. Surface blemishes
 3. Wear
 4. Fractures

WARNING: Replace pins that show distortion, have surface scars, are worn or contain fractures.

Step 7.

CONNECTING LINK BD-3

- A. Inspect connecting links for elongated pin holes, wear and fractures.

WARNING: Replace connecting links that have elongated pin holes, and are worn or contain fractures.

Step 8.

SWIVEL JAW BD-4

- A. Inspect swivel jaw for wear and damage. Serrations must be sharp and free of imperfections.
- B. Swivel jaw must turn freely in clamp. During assembly—insert lubricant in body recess before installing swivel jaw. Recommended lubricant is powdered graphite of Molybdenum Disulfide grease. Tighten screw and lock nut, then reverse nut one turn to allow free rotation of the swivel jaw.

WARNING: Replace worn, dull or damaged swivel jaws.

Step 9.

BODY BOLT and BODY SPACER SLEEVE BD-5

- A. Inspect body bolt and spacer sleeve for wear at position where sleeves contact shackle.
- B. Inspect body bolt. Replace if damaged.
- C. Make certain body bolt nut is tight.

When replacing body bolt, tighten bolt and nut, center-punch bolt and nut at thread joint to lock nut in place.

Step 10.

CONNECTING LINK SPACER SLEEVE BD-6

- A. Inspect spacer sleeve for wear and fractures. Replace if damaged.

Step 11.

GRIPPING CAM BD-8

- A. Inspect cam for chipped or worn teeth. Teeth must be sharp and free of foreign matter.
- B. Inspect cam for fractures and wear.

WARNING: Replace cams with fractures, chipped or worn teeth.

Step 12

CONNECTING LINK BOLT and NUT BD-10

- A. Inspect connecting link bolt for wear and distortion. Replace if damaged. When replacing, tighten bolt and nut, center-punch bolt and nut at thread joint to lock nut in place.

Step 13.

ASSEMBLY

After reassembly, check operation of clamp. All parts should move freely without binding.

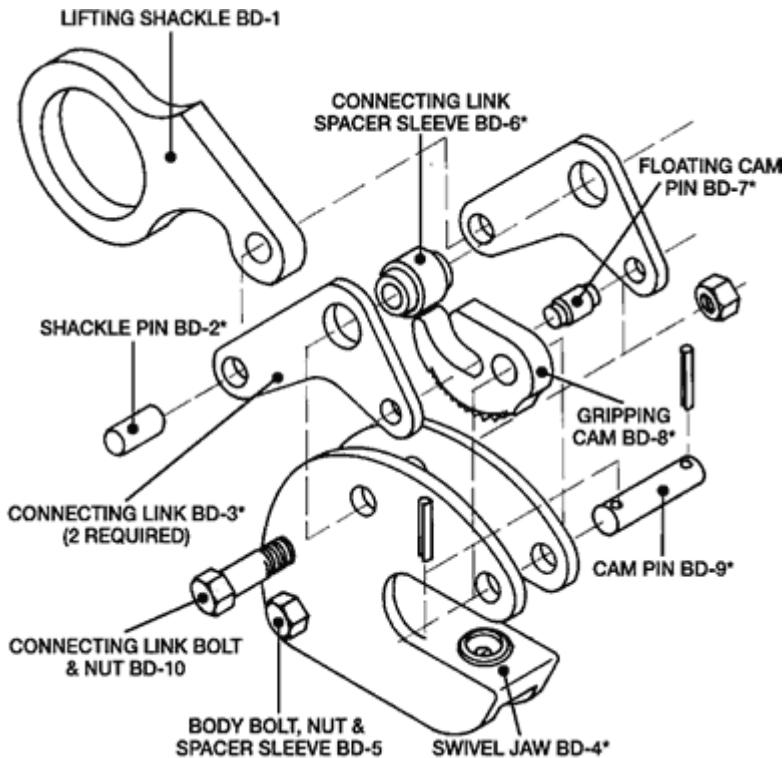
WARNING: All retaining pins and fasteners must be in place.

GENERAL

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

Use only RENFROE replacement parts to insure maximum efficiency and safety factor originally built into the product. Refer to RENFROE catalog for instruction on ordering replacement parts.

WARNING: Do not weld, grind or modify the clamp body or component parts in any manner. In the event the stenciling is worn and not legible or the tag containing the mode, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.



*These parts are included in Renfroe Repair Kit

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RENFROE



Model FR Clamp

Application, Operation and Maintenance Manual

OM 211-FR



Operators Manual

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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.

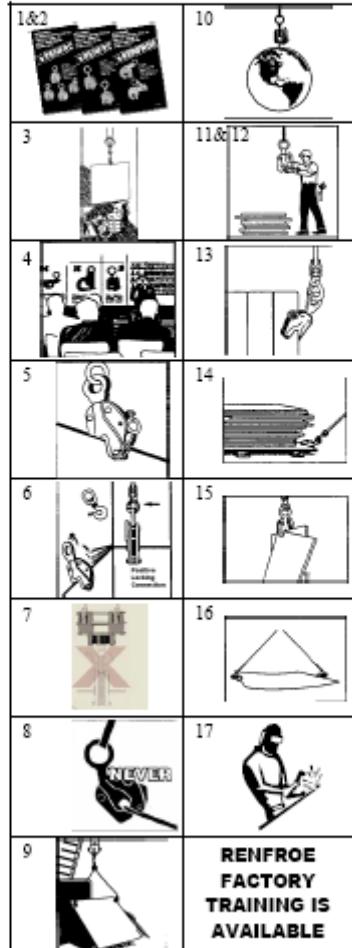
Failure to review and utilize recommended applications, operation and maintenance instructions may result in serious injury to operator and others.

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 Renfroe 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.



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

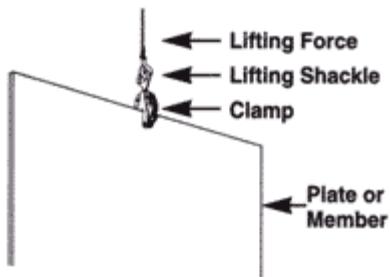
Phone: 904-356-4181
Fax/Fax: 904-354-7865
Internet: www.jcrenfroe.com
E-Mail: sales@jcrenfroe.com

OPERATING AIDS (DO'S AND DON'TS)

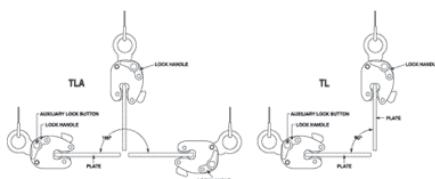
1. DO read and understand the Operators Manual before using the clamp
2. DO Consult Operator's Manual or RENFROE when in doubt.
3. DON'T Lift over workmen DON'T lift over Safety Areas or personnel.
4. Do attend a factory training class for establishing proper use of Renfroe Products.
5. DO Lock clamp closed before lifting load. 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 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 this 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 Operators Manual
13. DON'T Side load with a straight shackle clamp. DON'T lift from side with vertical 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 job. DON'T lift plate horizontally with a vertical lift only clamp.
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DEFINITIONS

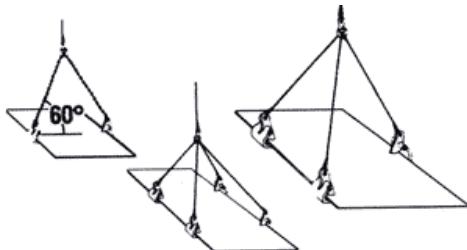
VERTICAL LIFT: The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



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 FR

VERTICAL LIFTING LOCKING

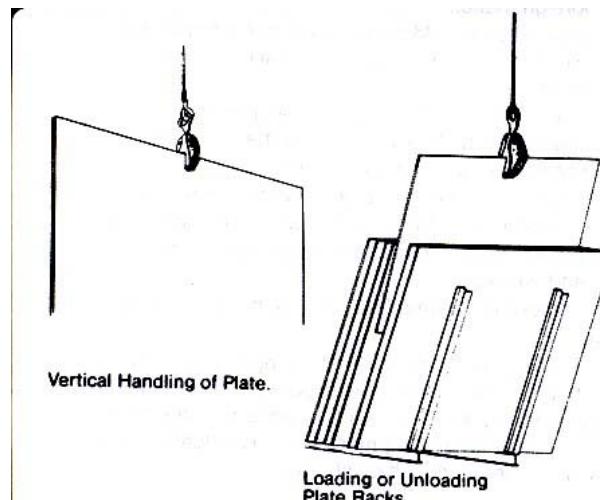


Application FR

The model "FR" is a vertical lifting clamp for light work. It is small and easy to handle in capacities through three tons. Refer to Illustrations shown below. It incorporates a "Lock Closed" feature which facilitates attaching the clamp to the plates. Refer to Definitions for explanation of "Lock Closed" clamp.

Refer to exploded view of clamp located at the end of the Maintenance Section for identification of component parts.

WARNING: Refer to the sections on operation and maintenance for the approved procedures in the operation and maintenance of this product.



Operation FR

Step 1.

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

Step 2.

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

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

Always use a clamp with maximum plate thickness and rated capacity nearly equal to the thickness and weight of the plate being lifted.

Step 3.

Inspect clamp before each lift.

WARNING: Do not use if in need of repair.

If in doubt, refer to Maintenance Section for detailed maintenance instructions and exploded view of the clamp for part identification.

- A. Check the clamp to be certain the Identification and warning tags are present and legible.
- B. Do not use the clamp if the tags are missing or illegible
- C. Inspect gripping surfaces for wear and defects. Gripping surfaces must be sharp and free of foreign matter.
- D. Swivel jaws should turn freely. Inspect swivel jaw mounting holes in body for elongation indicating overloading and wear.
- E. The lock springs must have a definite amount of tension when the lock is moved to the "Lock Closed" position without material in the clamp.
- F. Inspect condition of body for wear, damage and distortion, particularly in the area of the jaw opening.
- G. Inspect lifting shackle and all pin holes for wear and damage.
- H. Remove any clamp from service in need of repair.

Step 4.

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

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

Step 5.

Move lock lever to "Open" position. Refer to Illustration A.

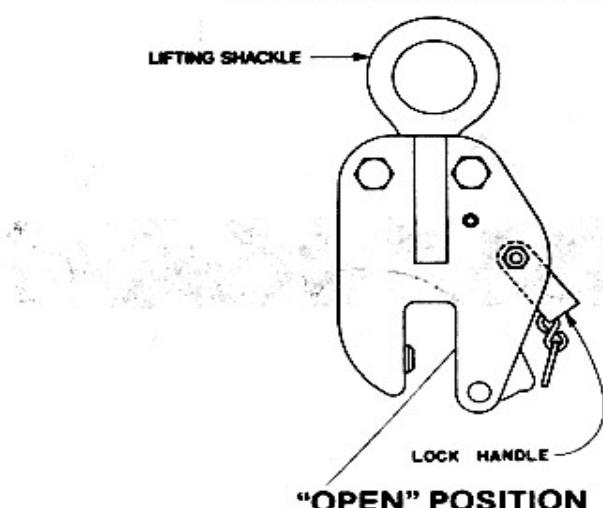
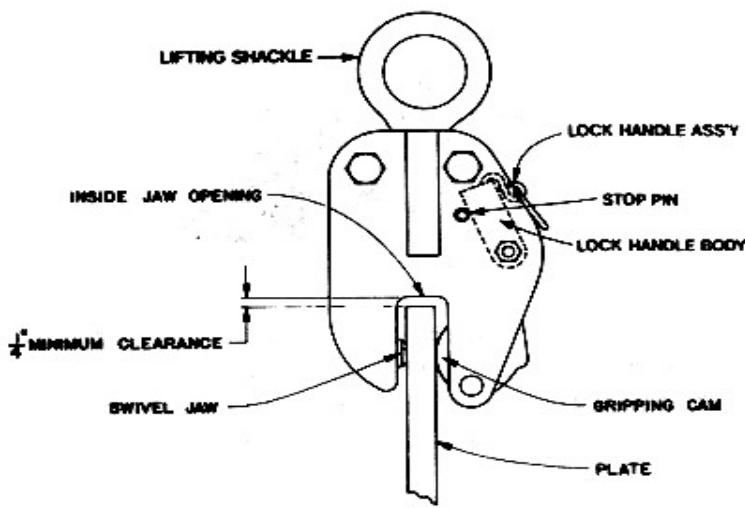


Illustration A

Step 6.

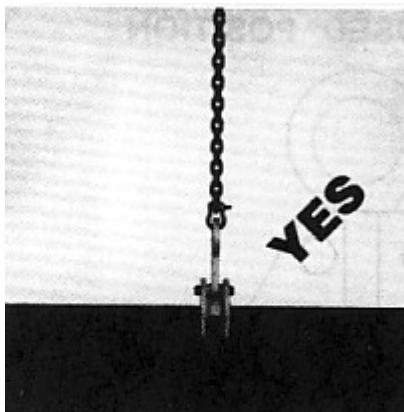
Position clamp on plate to be lifted. Do not allow inside of jaw opening to rest on edge of plate. Maintain 1/4" clearance. Refer to Illustration A, Step 5, and Photograph B.



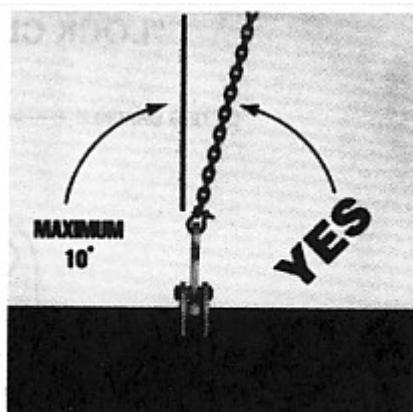
Position clamp so direction of force applied by the crane is in line with the lifting shackle.

WARNING: Never exceed ten degree side loading.

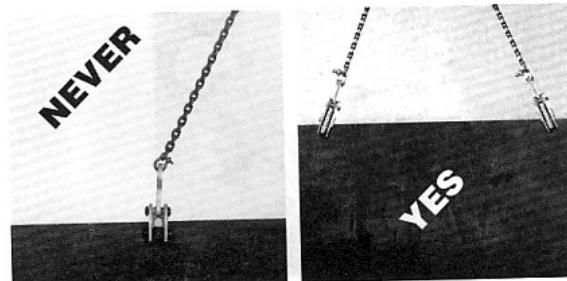
Refer to Photograph C and D.



Photograph C. (Typical)
Sling directly above and in line
with the lifting shackle.



Photograph D. (Typical)
Maximum allowable sideloading.



Photograph E. (Typical)
Excessive side loading.

Photograph F.
Clamps in line with sling.



Photograph G.

Step 7.

Make certain the swivel jaw and gripping cam are fully in contact with the plate and not partially on and off the edge of the plate.

Step 8.

Move lock handle to "Lock Closed" position after making certain the swivel jaw and gripping cam are fully in contact with the plate. Lock handle body must rest on stop pin.

WARNING: Lift only when clamp is in the "Lock Closed" position.
Refer to Illustration A, Step 5 and Photograph H.

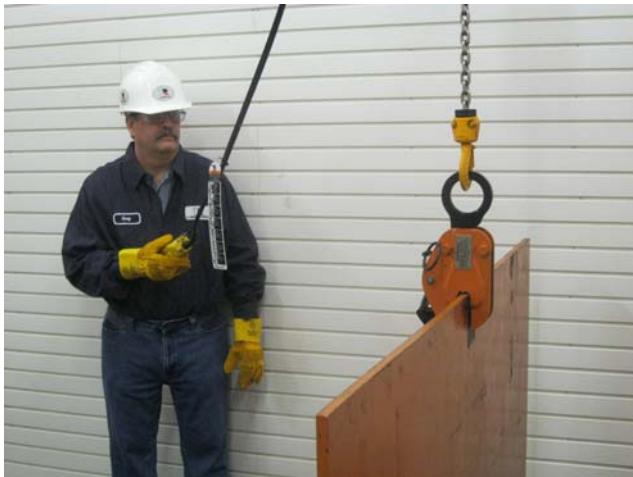


Step 9.

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.

Refer to Photograph J.



Step 10.

To remove clamp after plate is fully supported and at rest in a stable position, relax lifting force, move lock handle to "Open" position, lift clamp from plate.

Refer to Photograph K.

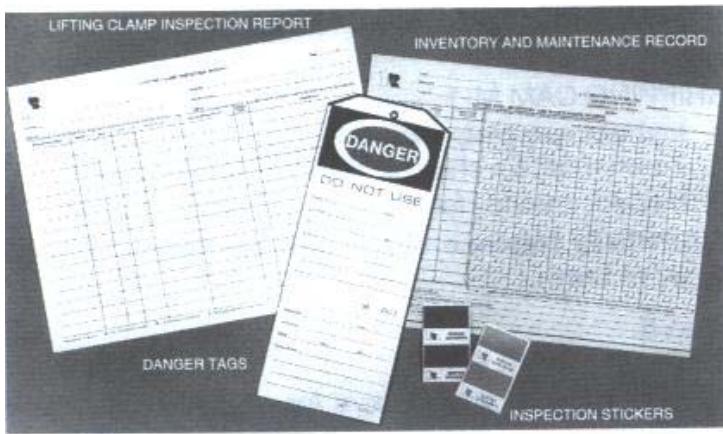


Step 11.

Inspect clamp. Remove from service if in need of repair.

WARNING: In the event the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.

Inspection kits are available at no charge upon request from the distributor or RENFROE. Kit contains:



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
- Swivel jaws should turn freely. Inspect swivel jaw mounting holes in body for elongation indicating overloading and wear.
- The lock spring must have a definite amount of tension when the lock is moved to the "Lock Closed" position without material in the clamp.
- Inspect the condition of the body for wear, damage and distortion, particularly in the area of the jaw opening.
- Inspect lifting shackle and all pin holes for wear and damage.

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 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 FR 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.

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. Check the internal and external surfaces of the body for wear and distortion.

C. Inspect the shackle pin guide slots located inside of the body. Guide slots must be smooth and free of indentations where the shackle pin may sit. Refer to the exploded view for shackle pin guide slot location..

D. Inspect all load bearing pin holes for wear and elongation.

E. Inspect inside jaw opening for displaced metal and distortion.

F. Inspect cam pivot holes for excessive wear.

G. Inspect lock stop pin for damage or distortion. This pin is used to stop the rotation of the lock assembly at the lock-closed position and must be in place.

H. Inspect the swivel jaw mounting hole for elongation and wear. The swivel jaw must turn freely. Remove the clamp body from service when the swivel jaw mounting hole dimensions equal or exceed those listed on the next page.

Rated Capacity Tons	Mounting Hole Dia. Inches	Mounting Hole Depth Inches
1/2	.905	.316
1	1.160	.426
2	1.290	.488
3	1.545	.520
20	3.545	.900

WARNING: Replace clamps containing fractures, elongated holes, worn and elongated swivel jaw mounting holes, distorted jaw openings and clamp bodies with worn or rough shackle pin guide slots.

Step 5

LIFTING SHACKLE FR-1

- A. Inspect lifting shackle eye for elongation and wear at point where the eye engages the sling attachment.
- B. Inspect shackle pin holes for wear and elongation. The difference between the pin diameter and the hole should not exceed 10%.
- C. Inspect shackle body for bending.

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

WARNING: Replace shackles that are bent, show excessive wear at eye, have elongated eye or shackle pin holes.

Step 6.

CAM ASSEMBLY FR-2

- A. Inspect cams for chipped or worn teeth. Teeth must be sharp and free of foreign matter.
- B. Inspect cam straps for distortion and fractures.
- C. Inspect holes in the cam straps for elongation and wear. The difference between the hole in the cam straps and the shackle pin should not exceed 10%

WARNING: Replace cam assemblies that have cams with worn or damaged teeth, contain fractures, or cams and cam straps with elongated pin holes.

Step 7.

SHACKLE PIN and CAM PIN FR-3 and FR-4

A. Inspect all pins for:

1. Distortion
2. Surface blemishes
3. Wear
4. Fractures

WARNING: Replace pins that are distorted, have surface scars, are worn, or contain fractures.

Step 8.

SWIVEL JAW FR-5

- A. Inspect the swivel jaw for fractures, damage and wear. Serrations must be sharp and free of foreign matter.
- B. Swivel jaw must turn freely in the clamp. During assembly—insert lubricant in body recesses before installing the swivel jaw. Recommended lubricant is a powdered graphite or Molybdenum Disulfide grease. Tighten screw and lock nut, then reverse nut one turn to allow free rotation of the swivel jaw.

WARNING: Replace worn, dull or damaged swivel jaws.

Step 9.

LOCK SPRING FR-6

Inspect lock spring for distortion. Spring must have a definite amount of tension when moved to the "Lock Closed" position without material in the clamp. Lock handle body must rest on stop pin. Refer to Illustration L.

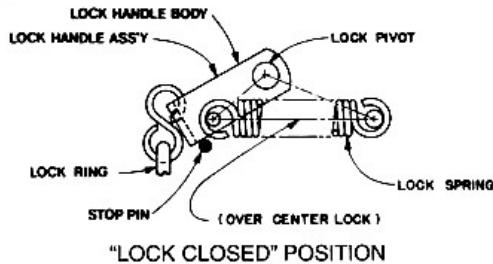


Illustration L

WARNING: Replace if damaged, distorted or lacking in tension.

Step 10.

LOCK ASSEMBLY FR-7

- A. Inspect for damage and wear. Lock assembly should pivot freely without binding. When assembling lock body to clamp, tighten pivot screw lock nuts then loosen until lock body pivots freely.
- B. Make certain locking ring is attached.

WARNING: Do not alter lock assembly. Use only component parts supplied by RENFROE. Replace lock if worn or damaged.

Step 11.

BODY BOLT and BODY SPACER SLEEVE FR-30

- A. Inspect body bolts and spacer sleeves for wear at position where sleeves contact shackle.
- B. Inspect body bolts.
- C. Make certain body bolt nuts are tight.

When replacing body bolts, tighten bolt and nut, center-punch bolt and nut at thread joint to lock nut in place.

WARNING: Replace body bolts, nuts and sleeves if worn or damaged.

Step 12.

ASSEMBLY

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

WARNING: All retaining pins and fasteners must be in place.

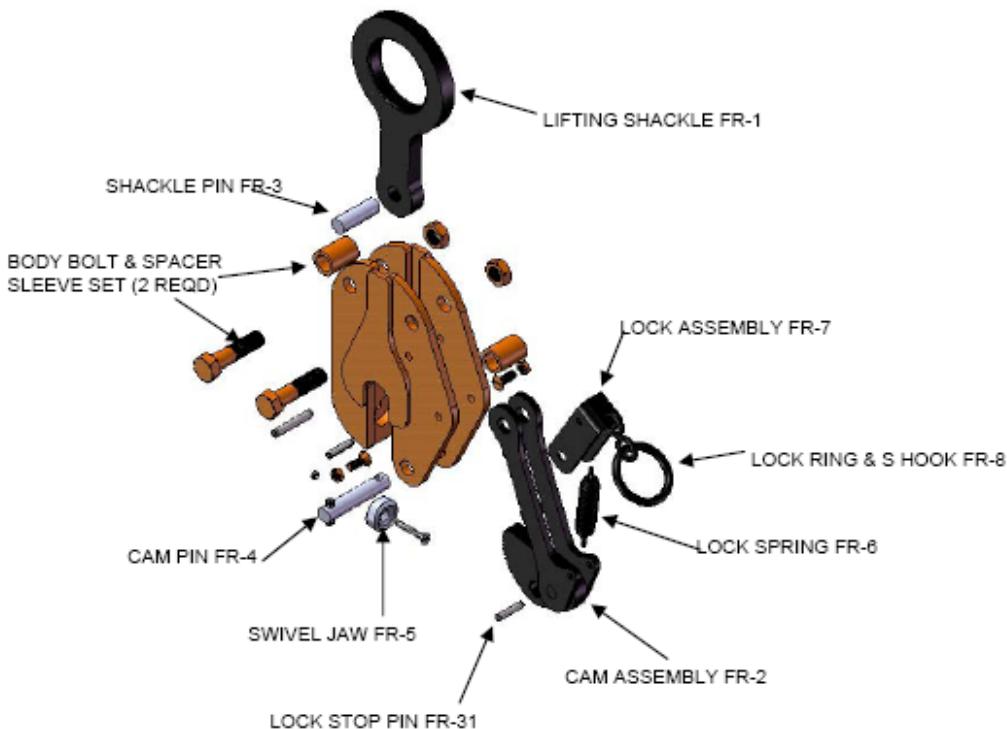
GENERAL

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

Use only RENFROE replacement parts to insure maximum efficiency and safety factor originally built into the product. Refer to RENFROE catalog for instructions on ordering replacement parts.

WARNING: Do not weld, grind or modify the clamp body or component parts in any manner. In the event the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.

Warning: The clamp must not be returned to service until any hazardous conditions found in any inspections are corrected.



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 (in Florida 904/356-4181)
Facsimile: 904/354-7865 • Internet: www.jcrenfroe.com

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



RENFROE



Model R



Model RO

Model R/RO Clamp
Application, Operation and Maintenance Manual

OM 480-R RO



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 mar-
keting of Lifting Clamps for
over fifty years. **RENFROE**
products are manufactured
in Jacksonville, Florida. A
worldwide network of stock-
ing distributors provides a
readily available source of
supply and service.

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

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.

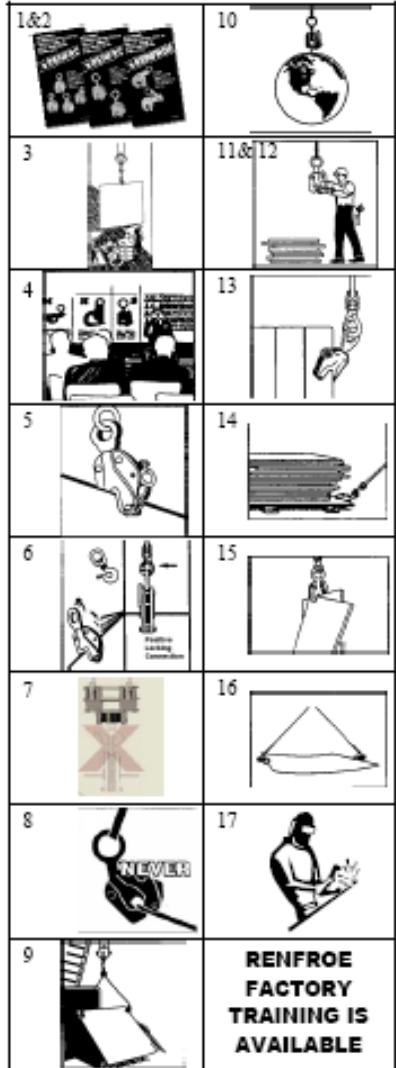
Failure to review and utilize recommended applications, operation and maintenance instructions may result in serious injury to operator and others.

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 Renfroe 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.



**RENFROE
FACTORY
TRAINING IS
AVAILABLE**



J.C. RENFROE & SONS, INC.
P.O. BOX 4279 / 1926 SPEARING STREET / JACKSONVILLE, FL 32201

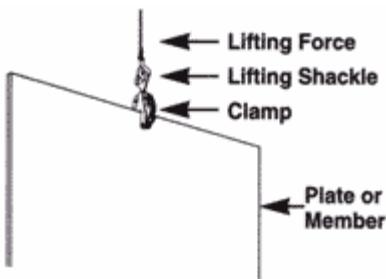
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OPERATING AIDS (DO'S AND DON'TS)

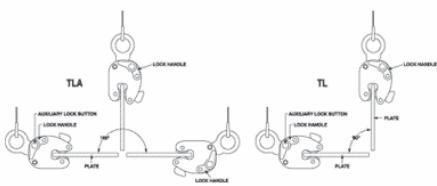
1. **DO** Consult Operator's Manual or RENFROE when in doubt. RENFROE factory representatives are available upon request at no charge to train and assist in establishing the proper use of RENFROE products.
2. **DO** Lock clamp closed before lifting load. **NEVER** lift with lock in open or "Lock Open"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

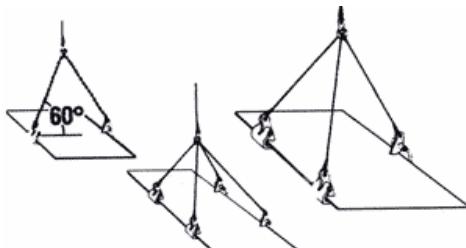


VERTICAL TURN/LIFT: A vertical turn/lift clamp is a vertical lifting clamp specifically intended to turn a single plate or member thru a ninety degree (90°) arc and back to vertical thru the same ninety degree (90°) arc or from horizontal to vertical to horizontal thru a one hundred and eighty degree (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 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 R

VERTICAL LIFTING LOCKING



MODEL RO

VERTICAL LIFTING LOCK OPEN ONLY



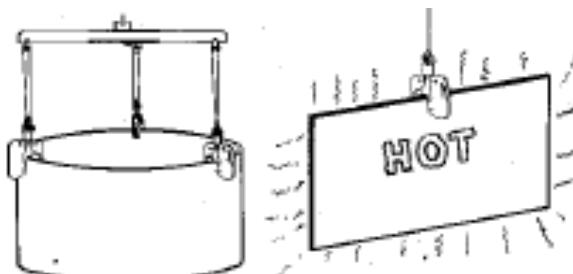
Application R/RO

The Model "R" is a vertical lifting clamp primarily used in the handling of heavy steel plates in a wide range of plate thicknesses. Specific models are available for handling "hot" plates, temperatures in excess of 200 Degrees F (+93 Degrees C). Refer to Illustrations on next page. For all applications involving the handling of "hot plates" refer to factory for written instructions.

The Model "R" incorporates a "Lock Open", "Lock Closed" feature which facilitates attaching and removing the clamp from the plate. The Model "RO" is available with a "Lock Open Only" feature allowing the clamp to be "Locked Open", lifted onto a "Hot" plate and the lock released by use of a "Tag Line" attached to the locking pin allowing the operator to be further away from the "Hot" plate. Refer to Definitions, Page 2, for explanation of "Lock Open", "Lock Closed" and "Lock Open Only" clamps.

For identification of component parts, refer to exploded view of clamps located at the end of the Maintenance Section.

WARNING: Refer to the section on operation and maintenance for the approved procedures in the operation and maintenance of this product.



Operation R/RO

Step 1.

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

Step 2.

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

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

Always use a clamp with maximum plate thickness and rated capacity near equal to the thickness and weight of the plate being lifted.

Step 3.

Inspect clamp before each lift.

WARNING: Do not use if in need of repair.

If in doubt, refer to Maintenance Section for detailed maintenance instructions and exploded view of the clamp for part identification.

- A. Check the clamp to be certain the identification and warning tags are present and legible.
- B. Do not use the clamp if the tags are missing or illegible.
- C. Inspect gripping surfaces for wear and defects. Gripping surfaces must be sharp and free of foreign matter.
- D. Some models of the "R" incorporate swivel jaws, while others incorporate die blocks.
 - 1. Swivel Jaws: Swivel jaws should turn freely. Inspect swivel jaw mounting hole in body for elongation indicating overload or excessive wear.
 - 2. Die Blocks: The retaining bolts must be tight and free of damage.
- E. Inspection condition of body for wear, damage and distortion, particularly in the area of the jaw opening.
- F. Inspect lifting shackle and all pins for wear and damage.
- G. Inspect locking mechanism and lock spring. The locking mechanism on the model "R" is designed to select a spring tension for various ranges of plate thicknesses. The spring must have a definite tension when the spring is set in the position of maximum tension without material on the clamp. Check spring for distortion and damage. Spring coils should be in contact with the adjacent coils when there is no tension applied to the spring. Lock handle and spring mechanism should operate smoothly without binding.
- H. Remove any clamp from service in need of repair.

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

Step 4.

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

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

Step 5.

Model with “Lock Open-Lock Closed” feature: Move lock handle to “Lock Open” position. Gripping cam is maintained in a retracted position. Refer to Illustration A.

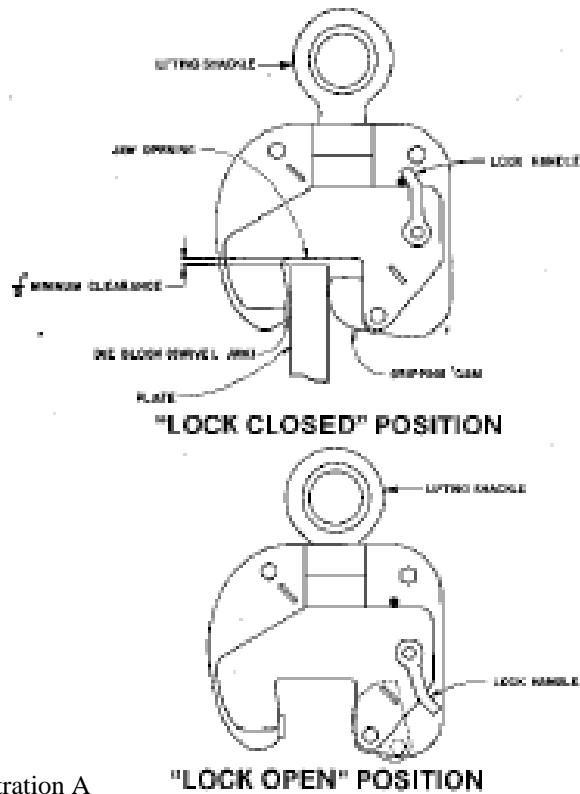


Illustration A

Model with “Lock Open Only” feature: Move gripping cam to the fully open position and insert locking pin, maintaining gripping cam in retracted position. Refer to Illustration B.

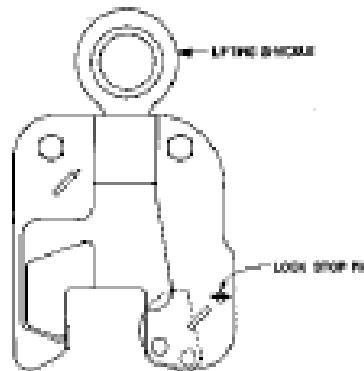
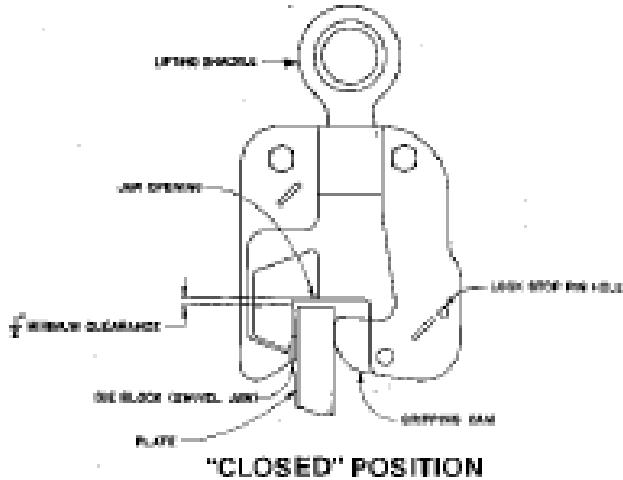


Illustration B

Step 6.

Position clamp on plate to be lifted. Always position clamp on plate so die block (swivel jaw) is in contact with plate before locking mechanism is actuated. Do not allow inside of jaw opening to rest on edge of plate. Maintain 1/2" clearance. Refer to Illustrations A and B, Step 5.

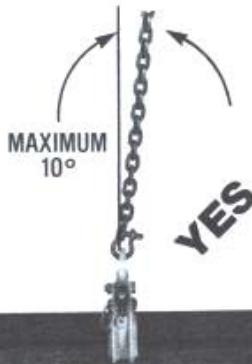
Position clamp so direction of force applied by the crane is in line with the lifting shackle.

WARNING: Never exceed ten degree side-loading.

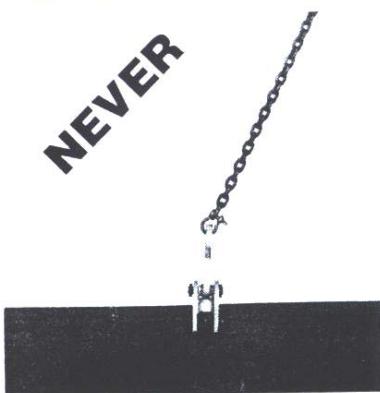
Refer to Photographs C, D, E, F and G.



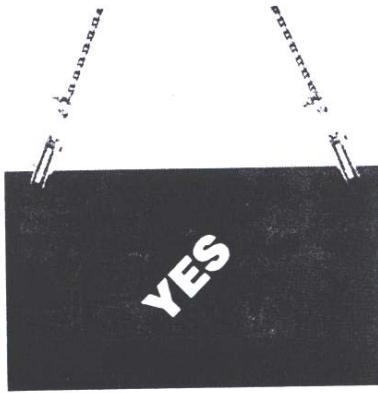
Photograph C. Sling directly above and in line with lifting shackle.



Photograph D. Maximum allowable sideloading



Photograph E. (Typical)
Excessive side loading.



Photograph F.
Clamps in line with sling.



Photograph G.

Step 7.

Make certain the swivel jaw or die block and gripping cam are fully in contact with the plate and not partially on and off the edge of the plate.

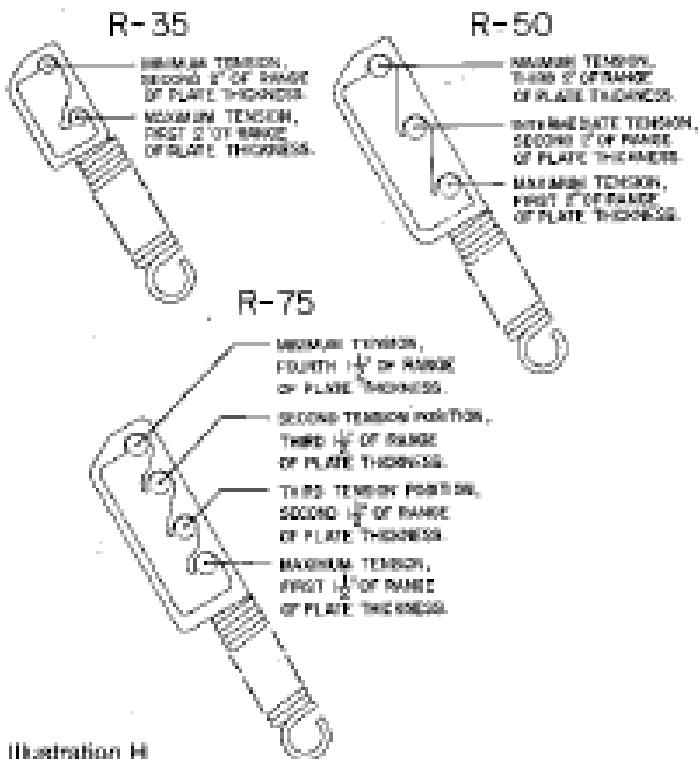
Step 8.

Model with "Lock Open-Lock Closed" feature: Place lock lever in "Lock Closed" position. Refer to Illustration A, Step 5.

The Model "R" locks have multiple spring tensions for various capacities.

WARNING: Use proper spring tension for plate thickness being lifted.

Refer to Illustration H.



R 35 Ton—4" plate variation—two tension positions. First two inches of plate thickness use maximum tension position. Second two inches of plate thickness use minimum tension position.

Example: Clamp rated 1/4—4 1/4" plate thickness. Use maximum tension on plate up to 2 1/4" thick. Use minimum tension of plate above 2 1/4" - 4 1/4" thick.

R 50 Ton—6" plate variation—three tension positions. First two inches of plate thickness use maximum tension position. Second two inches of plate thickness use intermediate tension position. Third two inches of plate thickness use minimum tension position.

Example: Clamp rated 6" to 12" plate thickness use maximum tension on plates 6" to 8" thick. Use intermediate tension on plates above 8" to 10" thick. Use minimum tension on plates above 10" to 12" thick.

R 75 Ton and R 100 Ton—6" plate variation—four tension positions. First one and one-half inches of plate thickness use maximum tension position. Second one and one-half inches use next to maximum tension position. Third one and one-half inches of plate thickness use next to minimum tension position. Fourth one and one-half inches of plate thickness use minimum tension position.

Example: Clamp rated 8" to 14" plate thickness use maximum tension on plate 8" to 9 1/2" thick. Next to maximum tension position on plates above 9 1/2" to 11" thick. Next to minimum tension position on plates above 11" to 12 1/2" thick and minimum tension position on plate above 12 1/2" to 14" thick.

Spring now exerts force on gripping cam.

WARNING: Lift only when clamp is in “Lock Closed” position.

Models with “Lock Open Only” feature: Remove lock stop pin, permitting gripping mechanism to engage plate. Refer to Illustration B, Step 5.

Apply a lifting force to the lifting shackle until gripping surfaces of the clamp are in full contact and exerting a force on the plate.

WARNING: A constant force must be maintained on the lifting shackle throughout the entire operation.

Step 9.

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.

Step 10.

To remove clamp:

Model with "Lock Open-Lock Closed" feature: After plate is fully supported and in a stable position, relax lifting force, keeping hands clear, move lock handle to "Lock Open" position—lift clamp from plate. Refer to Illustration A, Step 5.

Model with "Lock Open Only" feature: After plate is fully supported and at rest in a stable position, relax lifting force, move gripping cam to retracted position by manually operating shackle—insert lock stop pin—lift clamp from plate. Refer to Illustration B, Step 5.

Step 11.

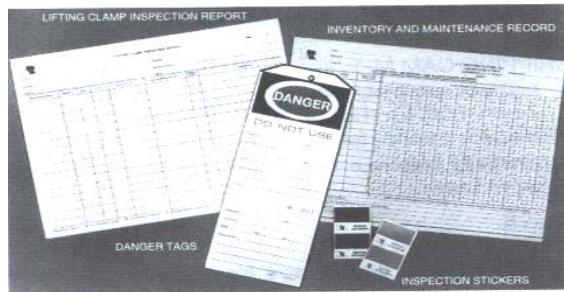
Inspect clamp. Remove from service if in need of repair.

WARNING: In the event the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.

Maintenance R/RO

Inspection Kits are available at no charge upon request from the distributor or RENFROE.

Kit contains:



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 master link and link chain legs for wear and damage.
- Inspect circular body of clamp for wear, distortion and damage.
- Inspect lock handle mechanism for wear, distortion or damage.

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)

Inspection Procedures

Step 1.

Verify the identity of the clamp by checking the identification plate on the clamp body. If the identification 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 identification 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 than 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 shackle pin guide slots located inside of body. Guide slots must be smooth and free of indentions to prevent shackle slide from hanging.
- C. Inspect all pin holes for wear and elongation.
- D. Inspect inside jaw opening for displaced metal and distortion.
- E. Inspect clearance of lock handle assembly mounting hole for wear. Clearance with shaft of lock handle assembly should be minor.
- F. Some models of the "R" incorporate swivel jaws, while others incorporate die blocks.

1. Swivel Jaw (round): Inspect swivel jaw mounting holes for elongation and wear. Swivel jaw must turn freely. Remove clamp body from service when Swivel Jaw Mounting Hole dimensions equal or exceed those listed below.

Rated Capacity Tons	Mounting Hole Dia. Inches	Mounting Hole Depth Inches
35	3.545	.900

2. Die Block (Rectangular): Inspect die block mounting holes and retaining bolts for distortion and damage. Die blocks must fit snugly in body recess.

WARNING: Replace clamps containing fractures, elongated swivel jaw or die block mounting recesses, distorted jaw openings and clamps with worn and rough shackle pin guide slots and jaw opening with displaced metal. Refer to exploded view.

Step 4.

LOCK ASSEMBLY, CAM FOLLOWER and BEARING

R-1, R-11 and R-12

- A. Inspect lock pawls and lock handle for damage and wear. Refer to exploded view.
- B. Inspect lock assembly pivot shaft mounted on right lock pawl for wear. Bearing, R-12 must fit snugly over shaft.
- C. Inspect cam follower, R-11 for wear and damage. Make certain that cam follower nut is tight during assembly.
- D. Inspect bearing, R-12 for damage and wear. Bearing must turn freely.

WARNING: Replace all parts that are damaged or worn.

Step 5.

LOCK SPRING ASSEMBLY R-2

- A. Inspect body for wear and distortion, particularly in the area where the body contains the stops for the various spring tension positions. Refer to exploded view.
- B. Inspect spring for damage and distortion. Spring coils must be in contact with the adjacent coil when spring is relaxed.

The spring must have a definite tension when the spring is set in the position of maximum tension without material in the clamp. To put the clamp in the maximum position with clamp fully assembled, adjust lock spring assembly until adjusting slot nearest to spring engages the shaft on the lock assembly, and the lock handle is moved to the "Lock Closed" position. Refer to exploded view .

WARNING: Replace lock spring assembly that is damaged or if the spring is distorted or lacking improper tension.

Step 6.

GRIPPING CAM R-3 and RH-3

- A. Inspect cams for chipped or worn teeth. Teeth must be sharp and free of foreign matter. Inspect the cams for fractures, particularly at the cam pin hole.
- B. RH-3 cams are intended to handle hot lifts only. This cam is identified by having two 3/16" holes drilled on the outside of the edge of the cam (when assembled in clamp) between the cam assembly pin and the cam pin. These holes are approximately 1/2" deep. Hot lift cams are painted red at time of shipment. Refer to exploded view.

WARNING: Replace cams with worn or damaged teeth, containing fractures or which have elongated pin holes.

Step 7.

CAMSTRAP ASSEMBLY R-4

- A. Inspect welds, internal and external surfaces for fractures, wear and distortion.
- B. Inspect all pin holes for wear and elongation.

WARNING: Replace cam strap assemblies that are distorted, contain fractures and have worn or elongated pin holes.

Step 8.

CAM ASSEMBLY PIN, SHACKLE PIN and CAM PIN

R-5, R-7 and R-9

- A. Inspect all pins for:

1. Distortion
2. Surface blemishes
3. Wear
- 4/ Fractures

WARNING: Replace pins that are distorted, have surface scars, are worn or contain fractures.

Step 9.

LIFTING SHACKLE R-6

- A. Inspect welds and body for fractures, wear and distortion.
- B. Inspect lifting shackle eye for elongation and wear at point where eye engages sling attachment.
- C. Inspect shackle pin hole for wear and elongation.

An elongated shackle eye indicates overloading. Elongated shackle pin holes indicate wear and possible overloading.

WARNING: Replace shackle that have elongated shackle eye, are worn or distorted and have elongated shackle pin holes.

Step 10.

DIE BLOCK R-8 and RH-8 (SWIVEL JAW)

- A. Inspect die block (swivel jaw) for fractures, damage and wear. Serrations must be sharp and free of imperfections and foreign matter.
- B. Die block s must fit snugly in body recess and swivel jaws must turn freely in swivel jaw mounting hole. During assembly—insert lubricant in body recess before installing swivel jaw. Recommended lubricant is powdered graphite or Molybdenum Disulfide grease. Tighten screw and lock nut, then reverse nut one turn to allow free rotation of swivel jaw. When installing die block, make certain the die block retaining bolts are free of damage and tight.

-
- C. Die blocks (swivel jaws) are also available for "Hot Lifts". These are identified by two holes 3/16" diameter and 1/2" deep in the gripping surface. "Hot Lift" die blocks (swivel jaws) are painted red at the time of shipment. Refer to exploded view.

WARNING: Replace worn, dull or damaged die blocks (swivel jaws).

Step 11.

BODY BOLT and SPACER SLEEVE SET R-10

- A. Inspect body bolts and spacer sleeves for wear at position where sleeve contacts shackle.
- B. Inspect body bolt. Replace if damaged.
- C. Make certain the body bolt nuts are tight.

When replacing body bolts, tighten bolt and nut, center-punch bolt and nut at thread joint to lock nut in place.

WARNING: Replace body bolt, nut and sleeve if worn or damaged.

Step 12.

LOCK STOP BOLT R-13

- A. The lock stop bolt is not supplied on all capacities. Some models have stops welded in place.
- B. Inspect lock stop bolt. Make certain the bolt is in place and tight.

WARNING: Replace damaged or missing lock stop bolts.

Step 13.

SHACKLE PIN SLIDE R-14

- A. Inspect slide for damage and wear.
- B. Inspect shackle pin hole in slide for wear and elongation. Sliding surfaces should be smooth.

The slide may be operated dry or lubricated. Recommended lubricant is powdered graphite or Molybdenum Disulfide grease.

WARNING: Replace shackle slides that are damaged, have worn or elongated holes or sliding surfaces that are not smooth.

Step 14.

COVER PLATE R-15

- A. Inspect cover plate for damage.
- B. Make certain all cover plate assembly bolts are in place.

WARNING: Do not operate clamp unless cover plate is in place,

Step 15.

LOCK STOP PIN R-16

- A. Inspect lock stop pin for damage and distortion.
- B. The lock stop Pin is used on "Lock Open" clamps. The lock stop pin is attached to the clamp body with a small link chain.

WARNING: Replace lock stop pins that are damaged or distorted.

Step 16.

ASSEMBLY

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

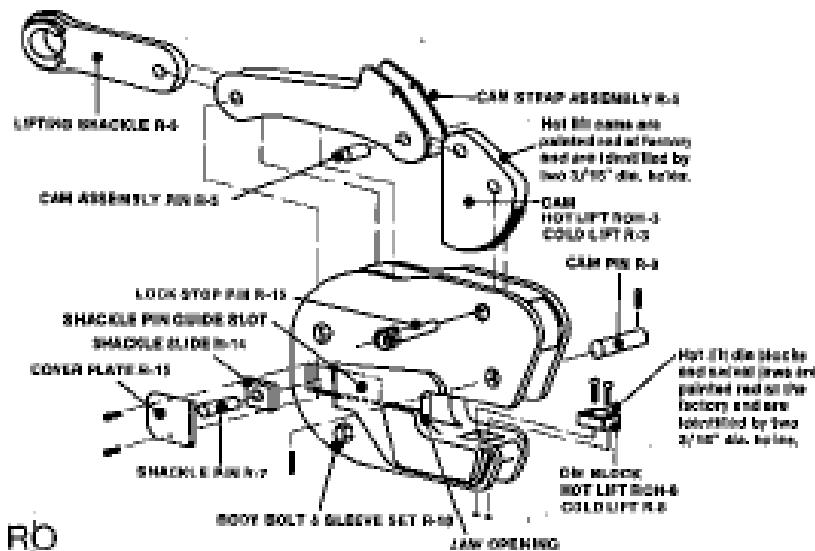
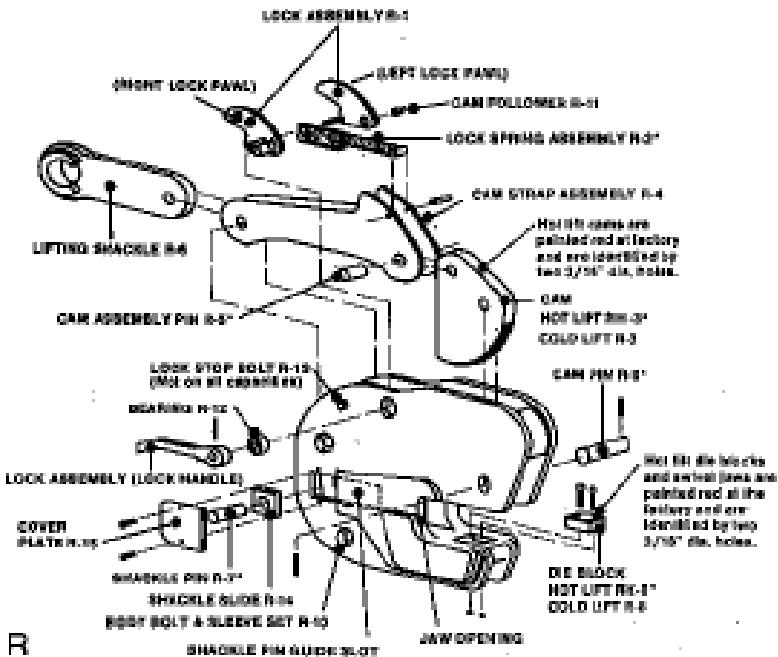
WARNING: All retaining pins and fasteners must be in place.

GENERAL

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

Use only RENFROE replacement parts to insure maximum efficiency and safety factor originally built into the product. Refer to RENFROE catalog for instruction on ordering replacement parts.

WARNING: Do not weld, grind or modify the clamp body or component parts in any manner. In the event the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.



Exploded View

*These parts are included in Renfroe Repair Kit.

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.

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Facsimile: 904/354-7865 • Internet: www.jcrenfroe.com

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



RENFROE



Model S Clamp
Application, Operation and Maintenance Manual
OM 211-S



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**

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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.

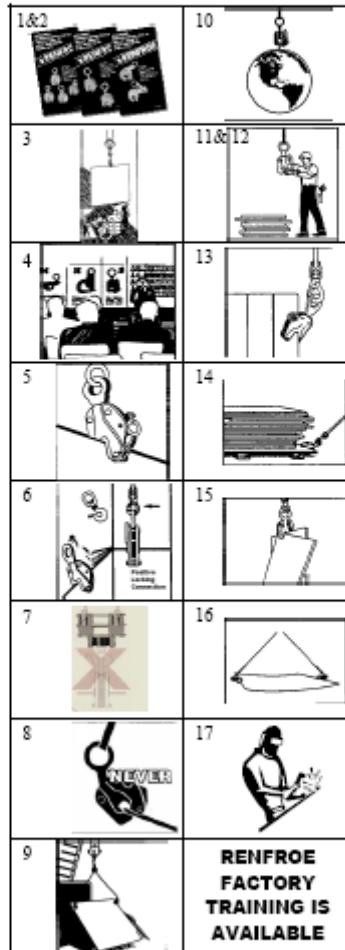
Failure to review and utilize recommended applications, operation and maintenance instructions may result in serious injury to operator and others.

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 Renfroe 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.



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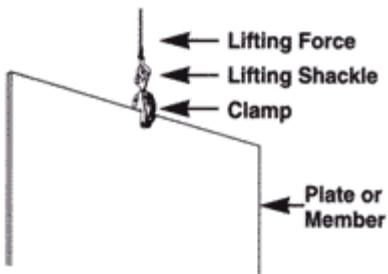
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OPERATING AIDS (DO'S AND DON'TS)

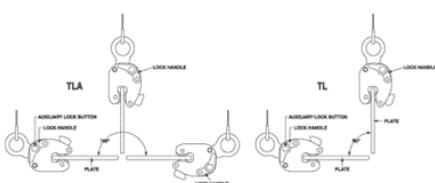
1. DO read and understand the Operators Manual before using the clamp
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5. DO Lock clamp closed before lifting load. DON'T lift with lock in open or "Lock Open" position.
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7. DON'T attach clamp directly to crane hook. DO use a flexible connection between crane 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 this 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 Operators Manual
13. DON'T Side load with a straight shackle clamp. DON'T lift from side with vertical 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 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

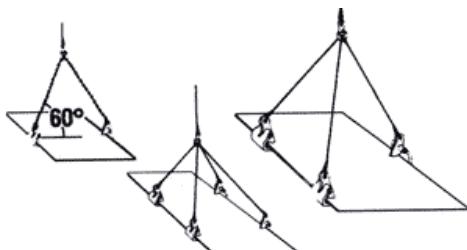
VERTICAL LIFT: The lifting of a single plate or member in which the lifting force exerted by the rigging is directly above and in line with the lifting shackle as shown in the illustration below.



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 S

VERTICAL LIFTING LOCKING

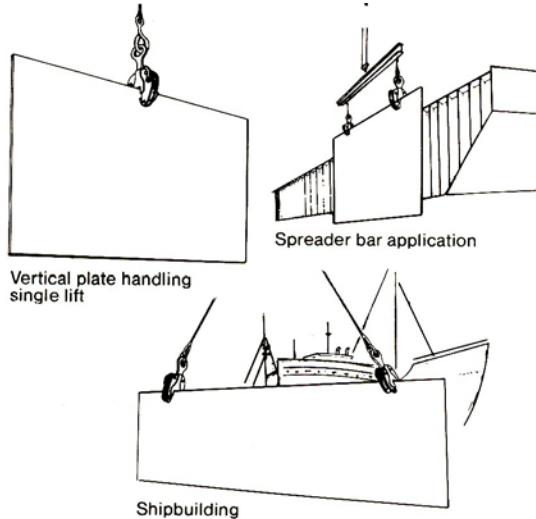


Application

The model "S" is a vertical lifting clamp and is an effective tool for construction and erection. Refer to illustrations shown below. It incorporates a "Lock Open", "Lock Closed" feature which facilitates attaching and removing the clamp from the plates. Refer to Definition Pages for the explanation of "Lock Open", "Lock Closed".

Refer to exploded view of clamp located at the end of the Maintenance Section for identification of component parts.

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



Operation S

Step 1.

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

Step 2.

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

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

Always use a clamp with maximum plate thickness and rated capacity near equal to the thickness and weight of the plate being lifted.

Step 3.

Inspect clamp before each lift.

WARNING: Do not use if in need of repair.

If in doubt, refer to Maintenance Section for detailed maintenance instructions and exploded view of the clamp for part identification.

- A. Check the clamp to be certain the Identification and warning tags are present and legible.
- B. Do not use the clamp if the tags are missing or illegible
- C. Inspect gripping surfaces for wear and defects. The gripping surfaces must be sharp and free of foreign matter.
- D. Swivel jaw should turn freely. Inspect swivel jaw mounting hole in body for elongation indicating overloading or wear.
- E. Inspect lifting shackle and all pins for wear and damage.
- F. Lock spring must have definite amount of tension when the lock is moved to the "Lock Closed" position without material in the clamp.
- G. Remove any clamp from service in need of repair.

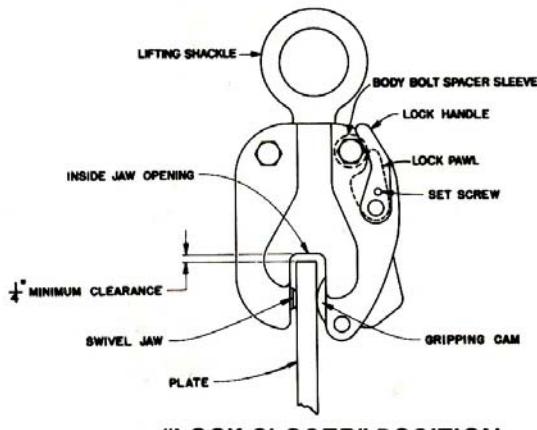
Step 4.

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

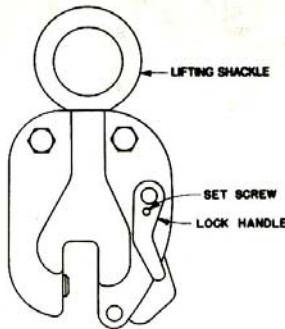
WARNING: Improper or excessively heavy rigging may interfere with the operation of the clamp and its ability to maintain a proper position on the plate. Never attach crane hook directly to the clamp—always use flexible sling between crane hook and clamp.

Step 5.

Move the lock lever to the "Lock Open" position. Gripping cam is now maintained in a retracted position. Refer to Illustration A.



"LOCK CLOSED" POSITION



"LOCK OPEN" POSITION

Illustration A

Step 6.

Install clamp on plate to be lifted. Do not allow inside of jaw opening to rest on plate. Maintain 1/4" clearance. Refer to Illustration A, Step 5 and Photograph B.

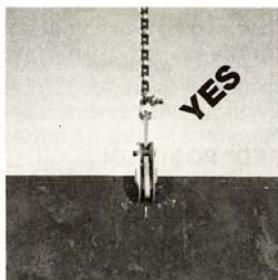


Photograph B

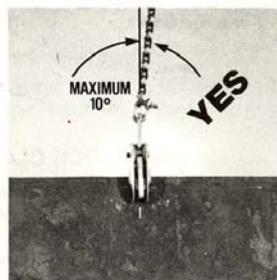
Position clamp so that the direction of force applied by the crane is in line with the lifting shackle.

WARNING: Never exceed 10 degree side-loading.

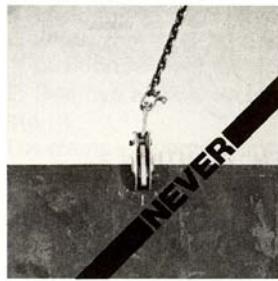
Refer to Photographs C, D, E, F and G.



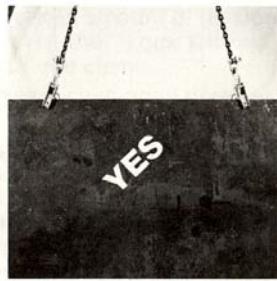
Photograph C (Typical)
Sling directly above and in line
with lifting shackle.



Photograph D (Typical)
Maximum allowable
sideloading.



Photograph E (Typical)
Excessive sideloading.



Photograph F (Typical)
Clamps in line with sling.

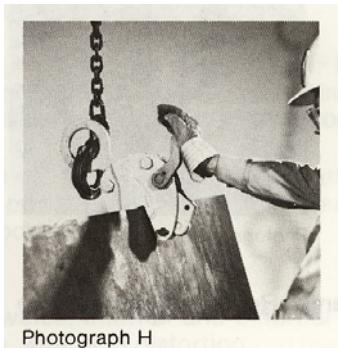


Photograph G (Typical)

Step 7.

Move lock handle to "Lock Closed" position after making certain the swivel jaw and gripping cam are fully in contact with the plate and not partially on and off the edge of the plate. Lock Pawl must rest on body bolt spacer sleeve. Spring now exerts force on gripping cam. Refer to Illustration A, Step 5, and Photograph H.

WARNING: Lift only when clamp is in "Lock Closed" position.



Photograph H

Step 8.

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.

Refer to Photograph J.



Photograph J

Step 9.

To remove clamp—after plate is fully supported and at rest in a stable position, relax lifting force, keeping hands clear, move the lock handle to the “Lock Open” position—lift clamp from plate. Refer to Illustration A, Step 5 and Photograph K.



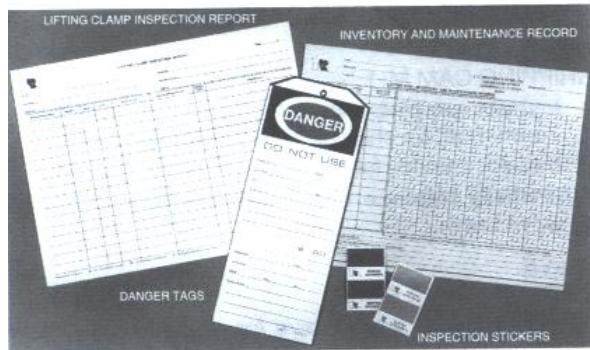
Photograph K

Step 10.

Inspect clamp. Remove from service if in need of repair.

WARNING: In the event the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.

Inspection Kits are available at no charge upon request from the distributor or RENFROE. Kit contains:



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

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.
- Swivel jaws should turn freely. Inspect swivel jaw mounting holes in body for elongation indicating overloading and wear.
- The lock spring must have a definite amount of tension when the lock is moved to the "Lock Closed" position without material in the clamp.
- Inspect the condition of the body for wear, damage and distortion, particularly in the area of the jaw opening.
- Inspect lifting shackle and all pin holes for wear and damage.

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

Periodic Inspection:

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

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

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

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

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 S 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.

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 shackle pin guide slots located inside of body. Guide slots must be smooth and free of indentations where shackle pin may seat. Refer to exploded view.
- C. Inspect all pin holes for wear and elongation.
- D. Inspect inside jaw opening for displaced metal and distortion. Refer to exploded view located at the end of this section.

- E. Inspect clearance of lock handle assembly mounting hole for wear. Clearance with shaft of lock handle assembly should be minor. Mounting holes that are worn oversized may cause the lock handle to malfunction.
- F. Inspect swivel jaw mounting hole for elongation and wear. Swivel jaw must turn freely.
- G. Remove clamp body from service when swivel jaw mounting hole dimensions equal or exceed those listed on this chart:

Rated Capacity Tons	Mounting Hole Dia. Inches	Mounting Hole Depth Inches
2	1.545	.520
4	1.545	.520
8	1.790	.535
12	2.545	.775
20	3.545	.900

WARNING: Replace clamps containing fractures, elongated pin holes, worn or elongated swivel jaw mounting hole, distorted jaw openings, clamp bodies with worn and rough shackle pin guide slots and jaw openings with displaced metal.

Step 4.

LOCK ASSEMBLY S-21

- A. Inspect for damage and wear.
- B. Inspect lock handle for binding, particularly when moving lock handle to the "Lock Closed" position. If binding does occur, adjust set screws in body of lock handle to provide proper clearance. Refer to Illustration L and exploded view.

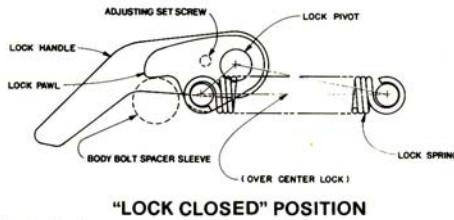


Illustration L

-
- C. Inspect lock assembly pivot shaft for wear.
 - D. When in the "Lock Closed" position, lock assembly must have a definite "Over Center" position. Lock Pawl must rest on body bolt spacer sleeve. Refer to Illustration L.

WARNING: Replace lock assemblies that have worn or damaged parts, fit loosely in the body mounting hole and do not have a definite "Over Center" "Lock Closed" position.

Step 5.

LOCK SPRING S-22

- A. Inspect lock spring for distortion. Spring must have a definite amount of tension when moved to the "Lock Closed" position without material in the clamp. Refer to Illustration L, Step 4.

WARNING: Replace if damaged, distorted, or lacking in tension.

Step 6.

CAM ASSEMBLY S-23

- A. Inspect cam for chipped or worn teeth. Teeth must be sharp and free of foreign matter.
- B. Inspect cam straps for distortion and fractures. Refer to exploded view.
- C. Inspect pin holes in cam straps and cam for elongation and wear.

WARNING: Replace cam assemblies that have cams with worn or damaged teeth, contain fractures, and cams and cam straps with elongated pin holes.

Step 7.

TOP ROLLERS S-24 (4 Ton capacities and above)

- A. Inspect top rollers for damage and wear.

WARNING: Replace if damaged or worn.

Step 8.

LIFTING SHACKLE S-25

- A. Inspect lifting shackle eye for elongation and wear at the point where eye engages the sling attachment.
- B. Inspect shackle pin hole for wear and elongation.
- C. Inspect shackle body for bending.

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

WARNING: Replace shackles that are bent, show excessive wear at eye, and have elongated eye and shackle pin holes.

Step 9.

SHACKLE PIN and CAM PIN S-26 and S-29

A. Inspect all pins for:

1. Distortion
2. Surface blemishes
3. Wear
4. Fractures

WARNING: Replace pins that are distorted, have surface scars, are worn or contain fractures.

Step 10.

BOTTOM ROLLER and BOTTOM ROLLER PIN S-27 and S-31

A. Inspect bottom roller for damage and wear.

B. Inspect bottom roller pin for distortion and wear.

WARNING: Replace roller and pin if worn or distorted.

Step 11.

SWIVEL JAW S-28

- A. Inspect swivel jaw for fractures, damage and wear. Serrations must be sharp and free of imperfections and foreign matter.
- B. Swivel jaw must turn freely in clamp. During assembly—insert lubrication in body recess before installing swivel jaw. Recommended lubricant is powdered graphite or Molybdenum Disulfide grease. Tighten screw and lock nut, then reverse nut one turn to allow free rotation of the swivel jaw.

WARNING: Replace worn, dull or damaged swivel jaws.

Step 12.

BODY BOLT and BODY SPACER SLEEVE S-30

- A. Inspect body bolts and spacer sleeves for wear at position where sleeves contact shackle.
- B. Inspect body bolt.
- C. Make certain body bolt nuts are tight.

When replacing body bolts, tighten bolt and nut, center-punch bolt and nut at thread joint to lock nut in place.

WARNING: Replace body bolts, nuts and sleeves if worn or damaged.

Step 13.

ASSEMBLY

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

WARNING: All retaining pins and fasteners must be in place.

General

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

Use only RENFROE replacement parts to insure maximum efficiency and safety factor originally built into the product. Refer to RENFROE catalog for instruction on ordering replacement parts.

WARNING: Do not weld, grind or modify the clamp body of component parts in any manner. In the event the stenciling is worn and not legible or the tag containing the model, capacity or other pertinent information is missing—do not use clamp until it has been properly labeled.

EXCLUSION OF WARRANTY

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



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