

SERVICE MANUAL

MESABI[®]

RTTS[®] TUBE & SHELL COOLERS

Please read and follow instructions carefully before proceeding with any service work and/or repairs. Consult factory before proceeding with any possible warranty claims.

MESABI® RTTS® Tube and Shell Heat Exchangers

CONTENTS

Warranty	Page 2
Standard Parts & Tool List	Page 3
Tube Removal	Page 4
Cleaning	Page 5
Tube & Seal Installation	Page 5
Inspection, Testing & Reinstallation	Page 6
Final Pressure Test	Page 7
Manufacturing & Parts Facilities	Page 8



For both in-plant and mobile equipment heat exchange: liquid-to-liquid, liquid-to-air and air-to-air heat exchange

- Individual cooling tubes are held in headers with flexible rubber seals to eliminate leaking
- Tubes are easily removed for cleaning or replacement if damaged, using simple hand tools
- Large tube diameters resist troublesome clogging
- 18-month warranty against seals leaking
- Available in corrosion-resistant materials

Operating Pressures:*

Shell side: 150 psi (1034 kPa)
Tube side: 50 psi (345 kPa)

Maximum Temperatures:

Water: 240° F (116° C)
Oil: 275° F (135° C)

* Optional pressures available.
Contact L&M Engineering for specific applications

L&M RADIATOR, INC. GENERAL WARRANTY

Consult L&M before proceeding with warranty claims or repairs. Failure to do so may void this limited warranty. This limited warranty allocates the risk of failure of the product(s) between the buyer and L&M and is reflected in the purchase price.

L&M warrants that MESABI® products will conform to L&M's written quotation specifications and drawings. MESABI® framework components are warranted for 18 months from the date of invoice against defects in materials and workmanship during normal usage. L&M warranty against seal leakage during normal operation is stated in individual product literature.

L&M's liability is limited to the rework or replacement (at L&M's sole option) of products or parts manufactured by L&M that are determined by L&M to be defective in workmanship or material or do not meet L&M's quoted specifications.

L&M product warranty does not apply if the product has been subjected to abnormal use or conditions, unauthorized modifications or repair, corrosion, misuse, neglect, abuse, accident, improper installation, or other acts which are not the fault of L&M, including damage caused by shipping.

L&M does not warranty products incorporated into L&M products that are not manufactured by L&M. Buyer's sole recourse with respect to such products will be subject to the warranty of the individual manufacturer.

OTHER THAN AS STATED HEREIN, L&M MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTERS WITH RESPECT TO THE SALE OF L&M PRODUCT(S) AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. IN NO EVENT WILL L&M'S LIABILITY INCLUDE ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, EVEN IF L&M KNEW OF THE LIKELIHOOD OF SUCH DAMAGES.

Any action or lawsuit for breach of the limited warranty in these L&M terms and conditions must be commenced in Minnesota. This warranty supersedes all previously published warranties.

MESABI® PRODUCT SPECIFIC WARRANTY

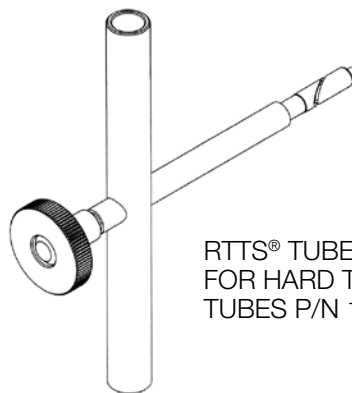
MESABI® RTTS® tube and shell coolers are covered by the L&M General Warranty along with the following Product Specific Warranty:

L&M Radiator warrants MESABI® RTTS® tube and shell coolers against seal leakage during normal operation for 18 months from date of invoice on new coolers.

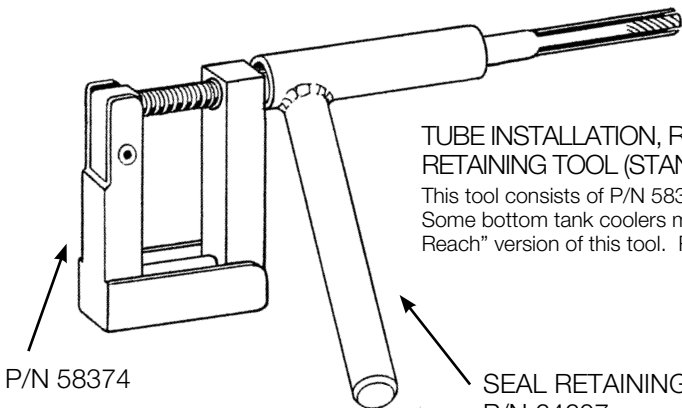
MESABI® RTTS® Tube & Shell Coolers – Standard Parts & Tool List

TOOL LIST

DESCRIPTION	PART NO.
RTTS® SEAL REAM TOOL (used to drill out seals with the tubes still in place)	79705
RTTS® INTERNAL TUBE CLEANING KIT	79901
(NOTE: Kit consists of clean-out rods, brushes, and cleaning instructions)	
HEADER PLATE HOLE CLEANING BRUSH	99785
SEAL LUBRICATING BRUSH	64091
SEAL LUBE.....	107271.99



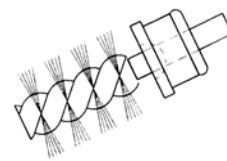
RTTS® TUBE REMOVAL TOOL FOR HARD TO REMOVE TUBES P/N 109044



TUBE INSTALLATION, REMOVAL AND SEAL RETAINING TOOL (STANDARD REACH) P/N 92376
This tool consists of P/N 58374 and P/N 64607. Note: Some bottom tank coolers may require the "Extended Reach" version of this tool. Request P/N 92377.

P/N 58374

SEAL RETAINING TOOL P/N 64607

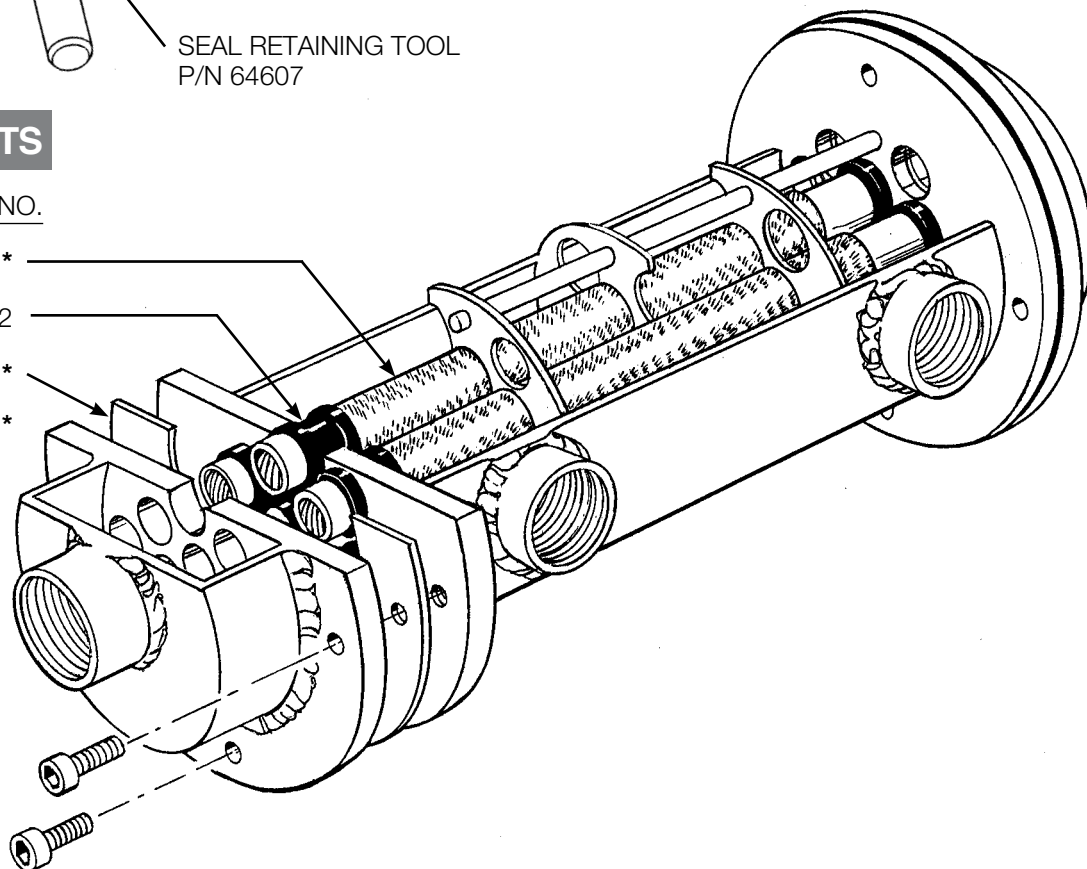


HEADER PLATE HOLE CLEANING BRUSH P/N 99785

STANDARD PARTS

DESCRIPTION	PART NO.
COOLING TUBE	*
SEAL	52812
GASKETS	*
FRAME PARTS	*

* See L&M drawing and parts list or contact factory. Please have the L&M serial number available at time of inquiry.



MESABI® RTTS® Tube & Shell Coolers – Tube Removal & Replacement

Tube Removal

1. For ease of removal, disconnect all plumbing to cooler (or remove cooler from radiator bottom tank, if applicable) and position cooler horizontally on a flat surface.
2. Although most of our units have notches to clearly identify the proper end cap location, if they do not, then mark the end cap and shell for proper alignment on reinstallation.
3. To access the cooler tubes, remove the end cap and retainer plate from each end of the RTTS® Cooler. In many cases, the retainer plate is integral to the end cap (see **Fig. 1**).

NOTE: The RTTS® assembly has the letters “L” and “S” stamped on opposite ends of the shell. The “L” designates the end of the cooler that the long unfinned portion of the tube is located. The “S” designates the end of the cooler that the short unfinned portion of the tube is located (see **Fig. 1**).

4. Insert the installation and removal tool P/N 58374 into a tube from the long (L) side. Make sure that the tool’s shoulder contacts the tube. Grip the tube by squeezing the tool’s handles together. Using a twisting motion, pull the tube until the short (S) end of the tube (opposite end) is pulled completely out of its seal (see **Fig. 2**). Repeat for each tube.

CAUTION: While pulling the tubes, take care to avoid pulling the short end seals into the shell. If a seal is inadvertently pulled into the shell, it **MUST** be retrieved.

Hard to remove tubes: If you find tubes hard to remove, use L&M Tube Removal Tool (P/N 109044) shown on page 3. To operate tool, loosen knob, insert the tool, tighten knob, then pull the tube out using a twisting action.

5. Remove all of the seals from the short end header sheet.
6. From the short end, grip the tube with the tube tool. With a twisting motion, pull the tube until the entire tube is removed from the shell. Repeat for each tube (see **Fig. 3**).
7. Remove all of the seals from the long end header sheet.

WARNING: Do not remove or loosen the bolt located at the center of each header plate. Contact factory for instructions if necessary.

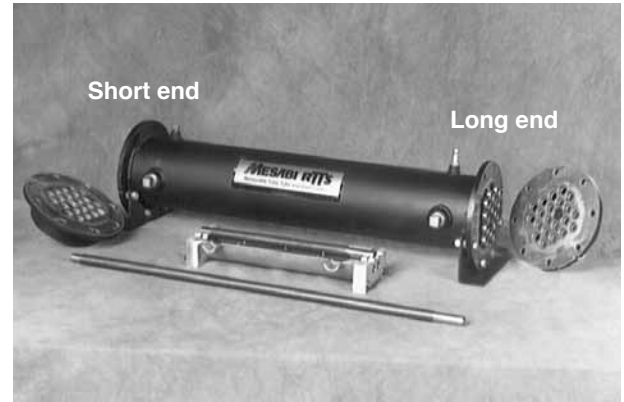


Fig. 1

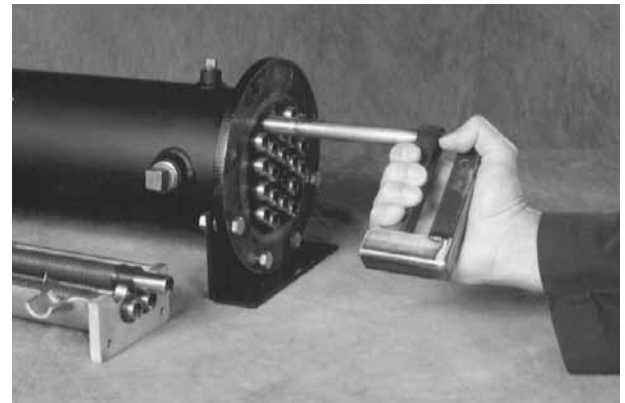


Fig. 2 Long end



Fig. 3 Short end

Cleaning

Cleaning

1. Clean both header plates and all holes. Try to see that no debris falls into the shell.
2. Stand the cooler vertically and flush with a high pressure hot water washer. Rinse out all contaminants.
3. Dry the inside of the cooler. Use a hot air blower, if available.
4. Inspect the tube ends for burrs. (Remove any burrs using a fine emery cloth.) Clean the machined ends, finning, and inside surface of each tube.

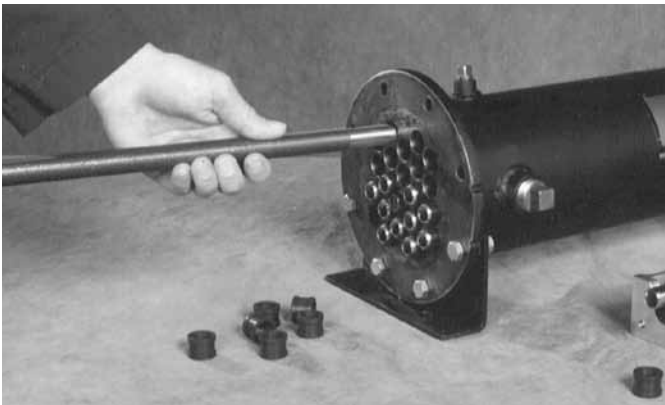


Fig. 4 Short end



Fig. 5A Short end

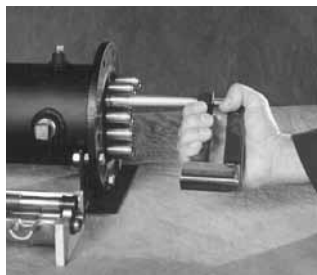


Fig. 5B Long end



Fig. 6 Short end



Tools required

Tube and Seal Installation

1. Wipe out the long (L) end header plate holes with a small amount of cleaning solvent and inspect each for damage.
2. Install new seals into the long end header plate holes. (Do not use lubricant to install seals.) Make sure the seal's outer lip is pushed flush to the header plate.
3. Prior to tube installation, lube the inner surface of each long end seal, and both tube ends with lube P/N 107271.99 and lube brush P/N 64091.
4. By hand, push the long end of each tube through the short (S) end header plate until the tube just contacts the long end seal. Repeat for each tube (see Fig. 4).
5. Place a plastic or wood backstop against the short tube ends to keep them from being pushed out during the next step. A metal backstop could cause damage to the tube ends (see Fig. 5A).
6. With a slight twisting motion, push the tube tool through a long end seal until the tool's shoulder contacts the tube. Grip the tube with the tool and with a twisting motion, pull the tube through the long end seal until the short end of the tube clears the short end hole. Make sure the seal lip remains flush to the plate. Repeat for each tube (see Fig. 5B).
7. Remove the backstop.
8. Wipe clean all short end header plate holes, using the same method as in step 1.
9. Install new seals into the short header plate holes. (Do not use lubricant to install seals.) Make sure the seal's outer lip is pushed flush to the header plate.
10. Lube the inner surface of each short end with lube P/N 107271.99 and lube brush P/N 64091.
11. Insert the installation and removal tool through the seal retaining tool P/N64607. With a slight twisting motion, push the tube tool through a short end seal until the tool's shoulder contacts the tube. Holding the seal retaining tool firmly against the top of the seal, grip the tube with the tool and with a slight twisting motion, pull the tube through the short end seal until about 1/4" of the tube end sticks outside of the seal. Repeat for each tube (see Fig. 6).

Inspection, Testing and Reinstallation

1. Inspect the tube ends for seal fragments. If you find any chipped seal material on a tube, that tube must be reinstalled with new seals.
2. Inspect each seal to ensure that they are all seated tightly against the header sheet. If a space greater than 1/32" exists between the header sheet and the outer lip of a seal, that seal must be removed, inspected, and reinstalled (see **Fig. 7**).

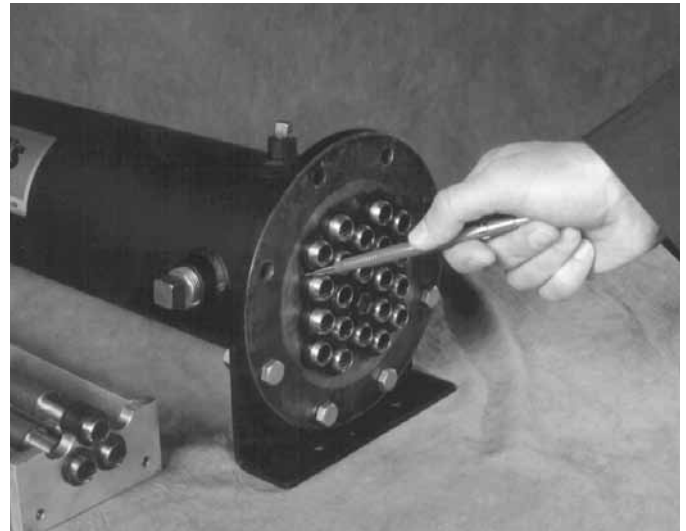


Fig. 7



Fig. 8

3. To test for leaks around the seals, apply 50 PSI to the oil side fittings for 15 minutes. Submerge the RTTS® cooler in water (or spray ends with soapy water) and inspect for bubbles (leaks) (see **Fig. 8**).
4. Reinstall the retainer plates and/or end caps. Use the proper L&M gasket to avoid damage to the seals.



Fig. 9

IMPORTANT: Gaskets are made from 1/8" compressed thickness. Use Ameraflex 1521-C or equivalent material. Damage will occur if proper thickness materials are not used.

Apply a small amount of silicone rubber to each side of the gasket. Make sure that notches in tank and shell are properly aligned (see **Fig. 9**).

Final Pressure Test

Final Pressure Test – out of the water with bleed lines

1. Add a bleed line to one of the shell side ports and put the end of the tube in a can of water (see **Fig. 10**).
2. Pressure the **tube side** (tank side) to **50 PSI (345 kPa)** and hold for 15 minutes (see **Fig. 10**). Significant air bubbles coming from the bleed line would normally indicate a seal leak. Tube leaks should have been found during the shell side underwater testing.
3. Following successful tube side testing, install the bleed line in one of the end tanks. (see **Fig. 11**).
4. Pressurize the **shell side** to **150 PSI (1034 kPa)** for 15 minutes. There should be no significant bubbling.



Fig. 10

RTTS® bottom tanks

1. Test the tube side per normal bolt-on tank pressure test procedure for the specific tank P/N being tested.
2. Cycle test four cycles as outlined above **at the pressure required for the specific P/N tank**. Contact L&M Customer Service for specific instruction.



Fig. 11

MESABI[®] heat exchangers are the world standard for heat exchanger reliability



L&M RADIATOR FACTORY-DIRECT SALES AND SERVICE

Because so many of our radiators and heat exchangers are a custom design, all sales are on a factory-direct basis. This assures that our customers receive a product that meets their cooling/heating requirements, offered to them at the least possible price.

We ship most parts within 24-hours. On-site technical and engineering assistance is available almost anywhere in the world within a few days notice.



L&M QUALITY POLICY

"The Quality Policy of L&M Radiator is to produce a quality engineered, quality manufactured product through continuous improvement that we deliver to the customer's satisfaction."



Manufactured and distributed by:

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