



SERVICE MANUAL

5.67 S-FIN AIR-TO-OIL AND HIGH PRESSURE AIR-TO-AIR COOLERS

PLEASE READ AND FOLLOW INSTRUCTIONS AND WARRANTY CAREFULLY BEFORE PROCEEDING WITH ANY SERVICE WORK AND/OR REPAIRS. CONSULT FACTORY BEFORE PROCEEDING WITH ANY POSSIBLE WARRANTY CLAIMS. ONLY USE GENUINE MESABI® PARTS.

ALWAYS CONSULT NAMEPLATE FOR MAX PRESSURE RATING.

IF YOU HAVE ANY QUESTIONS REGARDING THE PROCEDURES DESCRIBED IN THIS MANUAL, PLEASE CONTACT L&M RADIATOR, INC. AND ASK FOR CUSTOMER SERVICE.



L&M RADIATOR, INC. GENERAL WARRANTY

Consult L&M Radiator, Inc. 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 Radiator, Inc. and is reflected in the purchase price.

L&M Radiator, Inc. warrants that MESABI® products will conform to the L&M Radiator, Inc. 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. The L&M Radiator, Inc. warranty against seal leakage during normal operation is stated in individual product literature.

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

The L&M Radiator, Inc. 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 facts which are not the fault of L&M Radiator, Inc., including damage caused by shipping.

L&M Radiator, Inc. does not warrant products incorporated into L&M Radiator, Inc. products that are not manufactured by L&M Radiator, Inc. 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 Radiator, Inc. makes no representation or warranty of any kind, expressed or implied, as to the merchantability or fitness for a particular purpose, or any other matters with respect to the sale of L&M Radiator, Inc. products(s) and all implied warranties of merchantability or fitness for a particular purpose are hereby disclaimed. In no event will L&M Radiator, Inc.'s liability include any special, incidental, consequential, or punitive damages, even if L&M Radiator, Inc. knew of the likelihood of such damages.

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

MESABI® PRODUCT SPECIFIC WARRANTY S-FIN COOLERS

Consult L&M Radiator, Inc. before proceeding with warranty claims or repairs. 5.67 S-Fin General Warranty is 18 months from the date manufactured. Contact L&M Radiator Customer Service for more details.

MESABI® HEAT EXCHANGERS ARE THE WORLD STANDARD FOR HEAT EXCHANGER RELIABILITY

If you have any questions regarding the procedures described in this Service Manual, please contact L&M Radiator Customer Service.

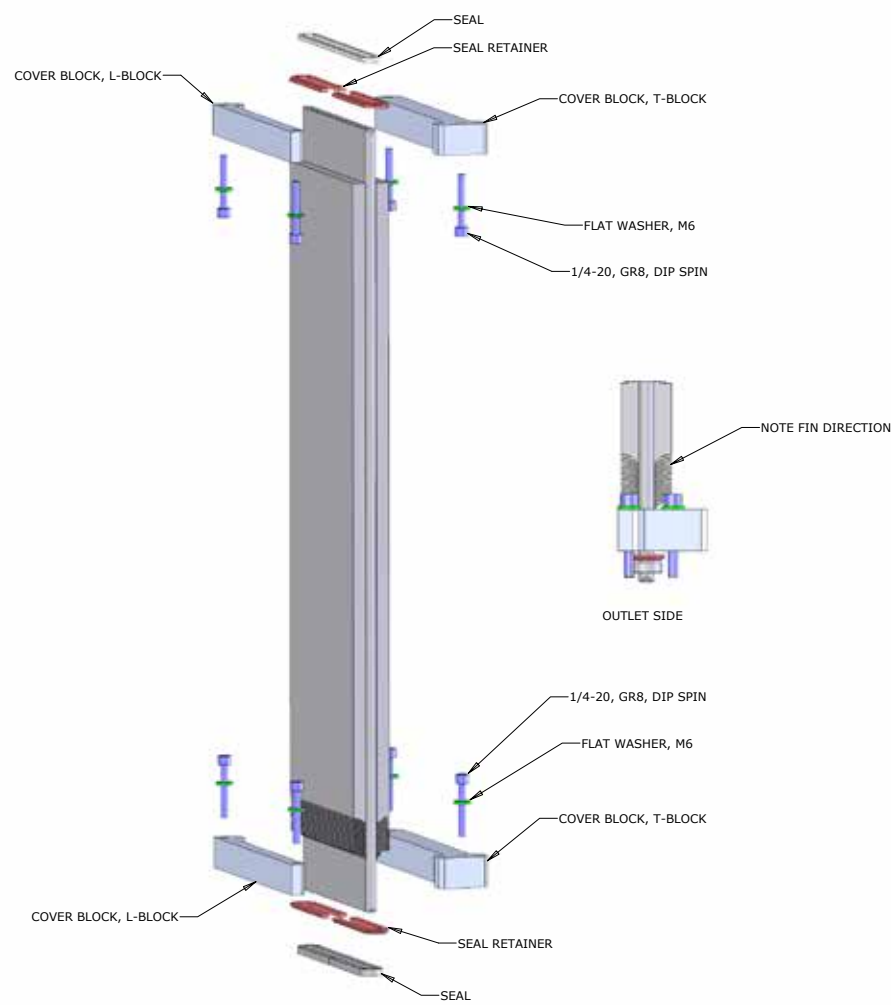
All information, illustrations, and specifications in this Service Manual are based on the latest information at the time of publication or posting online at www.MESABI.com. L&M Radiator reserves the right to make changes at any time without notice.

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GENUINE MESABI® PARTS

INLET SIDE



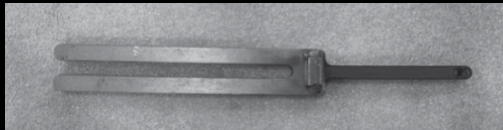
OUTLET SIDE

When purchasing parts, contact L&M Customer Service to ensure correct genuine Mesabi® parts.



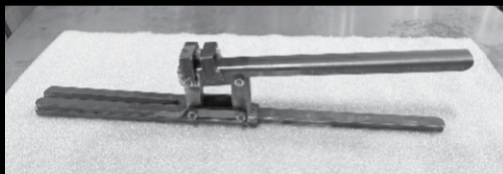
SEAL O-RING TOOL

#97892 Used for the removal of retainer clips.



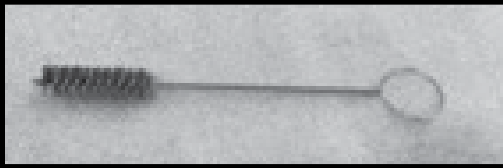
S-FIN SPACER TOOL

#121678 Used in the process of removing S-Fin tubes.



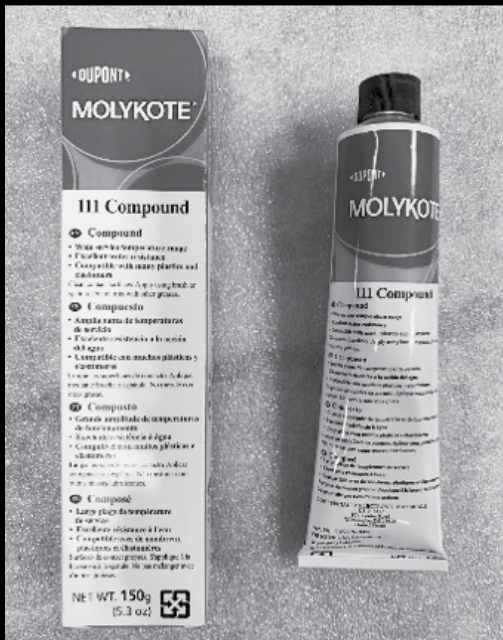
S- FIN INSTALLATION / REMOVAL TOOL

#364417 Used in the installation and removal of S-Fin tubes.



BRUSH

#63451 Used in header preparation.



SILICONE LUBRICANT

#100276 Used in tube preparation and frame assembly.



SEALANT – THREAD LOCKER

#119397 Used in frame assembly.



1 EXTERNAL CLEANING

To maintain efficiency and assure maximum life of MESABI® S-Fin Coolers, reasonable care must be taken when cleaning.

- 1.1** In some cases, it may be best to blow out any dry dirt with shop air prior to washing the core with a high-pressure washer. If there is any doubt on what cleaning method to use, try the method on a small portion of a single tube first, or contact L&M Customer Service.
- 1.2** For general external cleaning, high pressure hot water (with or without soap) can be used at pressures up to 1200 PSI (8274 kPa.) Spray straight into the core; do not spray at an angle and stay at least 6 inches away from the tubes. It is important to start on the air exit side first. Work from top to bottom. Concentrate on small areas and work slowly. Keep washing until the water exiting the opposite side is free from dirt and debris. Complete this side and then repeat the process on the other side.
- 1.3** Blow dry the core section.

NOTE: Many radiator shops use a hot alkaline soap or caustic soda with additives in their boil-out tanks. Soaking in high pH solutions may damage the aluminum alloy, depending on the exact characteristics of the solution. Solutions that are either too Alkaline (pH>9) or acidic (pH<5) are not recommended.

NOTE: Unless there is an issue with the frame condition or side member seals, it is not necessary to disassemble the frame for tube repair.



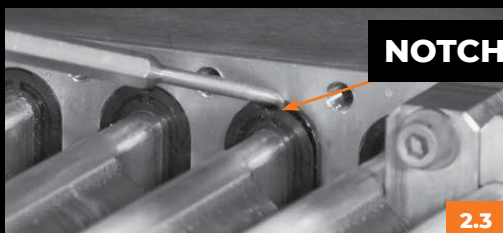
2 REMOVING MESABI® TUBES

NOTE: Removing tubes will require two people. Be sure to note fin orientation when removing tubes.

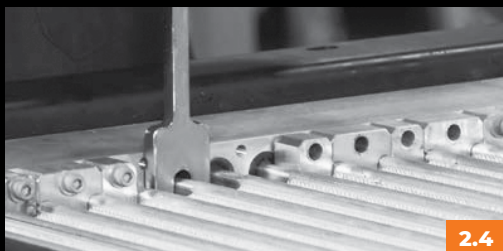
2.1 Remove support bar if equipped.



2.2 Remove the T and L blocks from tanks. Slide the T block out from between the tubes. Only need to remove the T and L blocks around the tube(s) being removed.



2.3 Remove plastic seal retainer. The notch on the retainer can be used to remove the retainer clip using the seal O-ring tool (#97892). Be very careful not to damage the tubes or sealing surface of the tank.



2.4 Place the S-Fin Spacer (P/N 121678) around the tube so the notch rests on the stop end tank surface identified with a machined “S” (next to the max pressure tested.)

NOTE: Do NOT let the spacer tool rest on the tubes as this could damage the tube.



2.5 Using the S-Fin installation/removal tool (P/N 364417) squeeze the tool pushing the tube into the float end of the tank until the tube is free from the stop end of the tank. The float end of the tank is identified with an “F” (machined in two locations.)



2.6 Once the stop end of the tube clears the header, slowly remove the tube using the least angle possible. Be careful not to damage the tube end. Set the tubes and removed parts aside. Keep them clean and protected for assembly.

NOTE: Do not force the tube out or tube could become damaged. If you are experiencing trouble removing the tubes, contact L&M Customer Service.

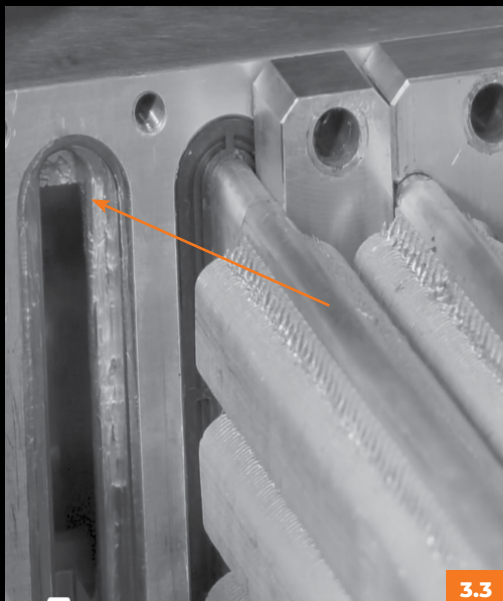


3 HEADER PREPARATION

3.1 Clean the seal pockets with a dry non-lubricant brush (#63451) in good condition. DO NOT use a steel or brass brush as the tube holes could be damaged.

3.2 Using compressed air blow the header plate/tanks out. Remove all debris loosened by the fiber brush. Inspect the sealing pockets to make sure there are no nicks, scratches, weld BB's, or other contamination especially in the sealing groove.

3.3 Lubricate the bevel on the header plate to help assist the installation of the tube.





4 TUBE PREPARATION

Before inserting new or original tubes into the header plates, new seals must be installed and lubricated properly as described below. This section addresses tube installation in an assembled frame. For frame assembly information see 6 Frame Assembly section at the end of the document.

- 4.1** Inspect the tubes for scratches, nicks, and other defects. Make sure the tube ends are clean and free from debris.

- 4.2** If any burrs or scratches are noticed, use 280 grit or finer sandpaper to clean the tube surface.

NOTE: Be sure to sand the full width in the direction shown to prevent low spots and valleys which can result in leak pathways.



- 4.3** Lubricate (P/N 100276) both ends of the tubes (Fig A) and seals (Fig B).



- 4.4** Install lubricated rubber seal over the tube end.

5 TUBE INSTALLATION



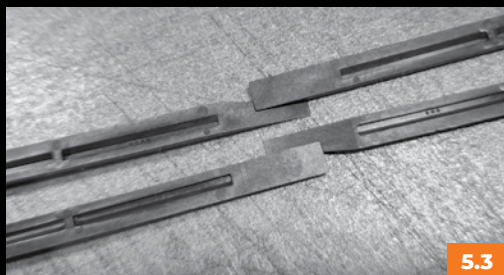
5.1

- 5.1** Carefully insert tube into the float end of the tank at the least angle possible. Be careful not to scratch or damage the tube hole and tube end. Note the tube orientation so the flow direction is correct through the turbulators.



5.2

- 5.2** Align the tube at the stop end tank hole and gently slide into place until it stops.



5.3

- 5.3** On the float end of the tank install seal retainers with the smooth side of the retainer facing towards the seal. Use the S-Fin Installation / removal tool (P/N 364417) to press the seal and seal retainers into the tube hole. The seal retainer will be flush with the surface of the tank if properly installed.



5.3

- 5.4** Install T-blocks on the float end tank. The bolts only need to be snug at this time. Repeat the process on the stop end tank.



5.5

- 5.5** Repeat steps 5.3 and 5.4 on the stop end tank.



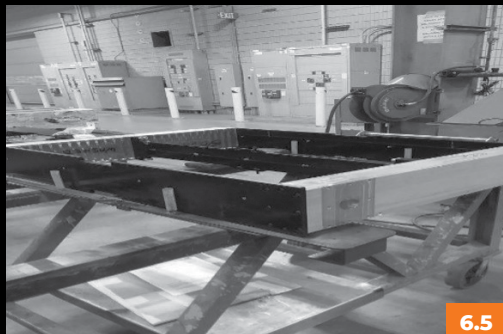
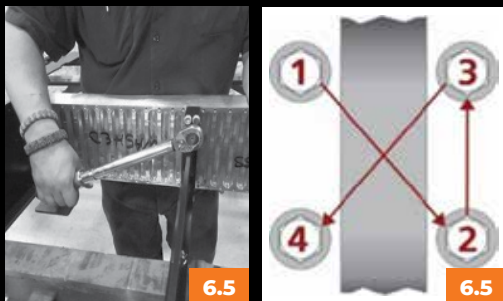
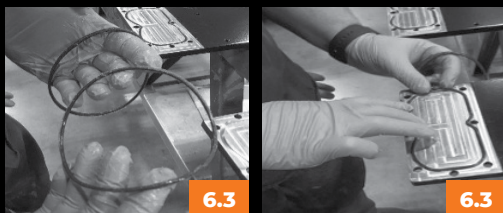
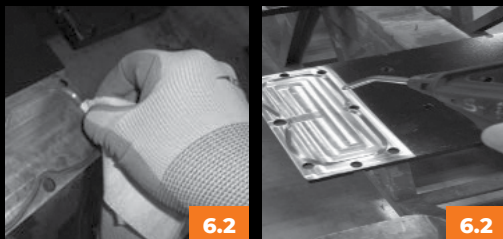
5.6

- 5.6** Finish installing T-blocks by torquing each 1/4" bolt to 12 ft-lbs (144 in-lbs., 53 newton meters.) Install support bars. Make sure the support material is not touching the tubes in the valleys. There should be a nominal 1/8" (+/- 1/16") gap between support valley and the round part of the tube.
EXCEPTION: The short bolt engagements above the inlet blocks should be torqued to 5 ft-lbs, 22 newton meters.

6 FRAME ASSEMBLY

Unless there is an issue with the frame condition or side member seals, it is not necessary to disassemble the frame for tube repair. Use instructions below to assemble, repair, and install new seals in the tank to side member assembly if required. If side members are removed, side member bolts and seals need to be replaced with genuine Mesabi® parts.

NOTE: Only remove inlet and outlet blocks if there is a seal failure. Contact L&M Radiator Customer Service for seal part number and torque values.



6.1 Tank extrusion should be clean and all O-ring grooves inspected for damage.

6.2 Clean out the seal groove in the side member and inspect groove for dirt or damage.

6.3 Lubricate side member seal with lubricant (P/N 100276) and carefully install to not twist the seal.

6.4 Install the side members and tanks. Snug all bolts and then torque bolts to the values noted below. Tighten side member/tank in a star pattern.

- Torque 5/16" Button Head to 17 ft-lb (204 in-lb.)
- Torque 3/8" Button Head to 27 ft-lb (324 in-lb.)

6.5 Apply thread locker (P/N 119397) to all tension tie bolts and torque following the torque value listed below and star pattern. Check the frame for squareness once torqued.

- Torque 5/16" Tension Tie Bolts to 22 ft-lb (240 in-lb.)
- Torque 3/8" Tension tie Bolts to 35 ft-lb (420 in-lb.)

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**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.