LIMITED WARRANTY

IEA, LLC ("IEA") warrants that Radiators and Components sold to Buyer (the "Products") shall meet performance or print specifications as stated in the IEA quote or Buyer-approved drawings. IEA warrants all Products manufactured or sourced by IEA and furnished to Buyer to be free from defects in material and workmanship under normal use and service.

The warranty period continues until the first to occur of 1) one year from date of installation or 2) eighteen months from the date of shipment from IEA.

Non-conforming Product covered by this Limited Warranty will be repaired or replaced by IEA provided that the subject Product was installed and maintained according to IEA's Installation and Operation Manual.

Buyer shall afford IEA the opportunity to utilize IEA Field Service technicians for all warranty or potential warranty claims or issues. When IEA technicians are not utilized, Product components identified as causing the warranty claim and therefore replaced must be returned to IEA for analysis or, if the Product is repaired rather than replaced, then acceptable digital pictures must be provided for warranty claim authorization.

IEA values its program of continuous improvement and therefore reserves the right to improve its products through changes in Product design or materials at its discretion without obligation to incorporate such changes in products it previously manufactured.

This warranty does not warrant against corrosion of radiators or components nor against damage caused by vibration.

Buyer's sole and exclusive claim under this Limited Warranty is the repair or replacement, at IEA option and expense, of the non-conforming Product or components thereof.

IEA warranties extend only to Buyer and are not assignable to, or assumable by, any subsequent purchaser, in whole or in part. Any such attempted transfer shall render all warranties provided hereunder null and void and of no further force or effect.

The warranties set forth are inapplicable to and exclude any defect, damage, or malfunction resulting from (i) normal wear and tear, (ii) misuse, negligence, or modification of the Product, (iii) repair service provided by third parties not approved in advance by IEA (iv) failure by Buyer to follow IEA installation and operation manuals or instructions, (v) failure of parts or components or services not provided by IEA or (vi) any other cause outside IEA's reasonable control.

The Warranties set forth above are in lieu of all other warranties, express or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose.

FORM #001: 9-21-12
SUPERSEDES: 5-20-10

I GENERAL INFORMATION

A.) Model/Part Number Nomenclature

Complete Part Number

XX 000 X 00

MODEL TYPE

EC: ENGINE COOLER (ENGINE MOUNTED)
HC: HORIZONTAL COOLER (REMOTE MOUNTED)
VC: VERTICAL COOLER (REMOTE MOUNTED)
MC: MULTI-FAN COOLER (REMOTE MOUNTED)
HCR: HORIZONTAL COOLER (ROUND TUBE REMOTE MOUNTED)

ASSEMBLY NUMBER

(MULTIPLE DIGITS)

RADIATOR MODEL DESIGNATION

EC: N – NO FAN (ENGINE MOUNTED FAN)
F – WITH FAN (RADIATOR MOUNTED FAN, ENGINE DRIVEN

HC, HCR, VC, MC: A, B, C, ETC. – ELECTRICAL MOTOR WINDING SPECIFICATIONS AND ENCLOSURE TYPE

ALL MODEL TYPES: S – SPECIAL VERSION OF ANY MODEL TYPE REQUIRING NORMALLY NON-STANDARD COMPONENTS

BASIC MODEL SIZE

(THREE DIGITS)

NOMINAL CORE FRONTAL AREA IN SQUARE FEET – MAY VARY SLIGHTLY FROM ACTUAL SQUARE FOOTAGE AND/ OR EFFECTIVE SQUARE FOOTAGE USED FOR COOLING CAPACITY

B.) Receiving and Inspection

Upon receiving your IEA radiator, check all items against the packing slip and the bill of lading to verify all items have been received. Accessories and ship-loose items are attached to the radiator shipping skid with the contents designated on the packing slip and bill of lading. Check the radiator and/or accessories for damage, particularly around the core area - any visible damage must be noted on the bill of lading prior to the carrier's departure. Any visible or concealed damage should be immediately reported to the carrier and a damage claim filed. Items on the packing slip that were not received should be reported to the carrier. Items not on the packing slip that should have been received should be reported to your local IEA representative as soon as possible. IEA cannot be responsible for unreported damages.

C.) STORAGE

All IEA radiators are finish painted prior to shipment unless otherwise specified.

If the radiator is to be stored, it should be kept in a clean and dry environment, not subjected to rapid temperature or humidity changes, and away from heavily traveled areas to avoid possible customer damage.

D.) Long Term Storage

Long term storage of product outside is not recommended. If long term storage must be done by the customer then the following is **RECOMMENDED** but can not be considered as assurance that start-up problems will not exist.

1. Remove the belts and store them in a weather protected area. Do not hang belts from a single point, coil them up and lay flat.
2. Grease the fan bearings and motor bearings at least once a quarter. Add enough grease to see it purging from the seals or the purge ports.
3. To protect the sheaves, you could apply grease or preservative compound. CAUTION: before use, all grease or compounds must be removed to help eliminate belt slip.
4. Grease any or paint any exposed shafts. Seal the keyways with grease to minimize water entry.
5. If present, energize the motor heater.
6. Rotate the motor and fan shafts, 10-15 turns every 30 days.
7. Protect the product from nesting animals and bugs.
8. Protect the product from weather damage.
9. Cover the motor to prevent being hit by direct rain but also taking care to leave sufficient ventilation openings to prevent condensation. Make certain the conduit box on the motor is covered or plugged to prevent water entry.
10. Treat the radiator internals in the same manner as recommended by the engine manufacturer for the engine. This will assure compatibility of preservation with the engine.
11. **NOTE:** Should the radiator be drained of fluids, the gaskets may shrink with time. Upon re-commissioning and filling there may be leaks present at the gaskets, allow 24 to 48 hours for the gaskets to swell before attempting to tighten any bolts. If the bolts are tightened prematurely the gaskets could be ruined and the radiator may require disassembly for replacement of the gaskets.

E.) Transporting

When the radiator is transported from the receiving area, use the following procedures to avoid damage:

It is recommended that the unit remain on the radiator shipping skid and be transported with a forklift. However, EC and VC type radiators are provided with lifting holes at each top tank end for crane transportation (see Fig 1). EC and VC type radiators of 52 square feet and larger have lifting points located on the radiator plenum (see Fig 2).

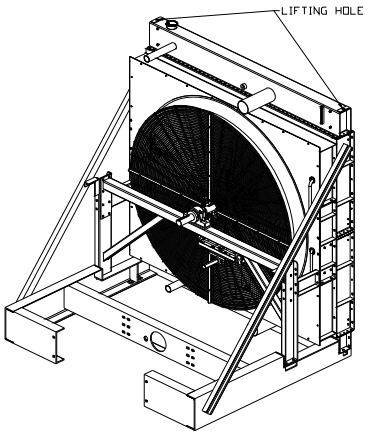


FIG 1 EC046

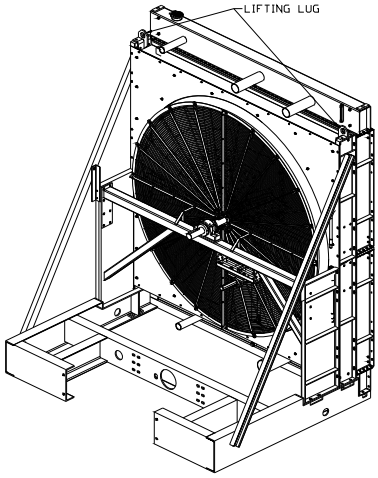


FIG 2 EC060

Single core HC type radiators, except an HC025, are provided with a lifting hole at each tank end (see Figs 3A & 3B). Multiple core HC type radiators are provided with lifting lugs that must be installed by the customer prior to radiator lifting (see Figs 4A & 4B). For lifting lug mounting procedure, refer to Installation section of this manual. **CAUTION** must be taken when rotating the unit from the "as shipped" position to a position resting on all four legs. When no crane service is available, the unit should remain on its radiator shipping skid and be transported with a forklift.

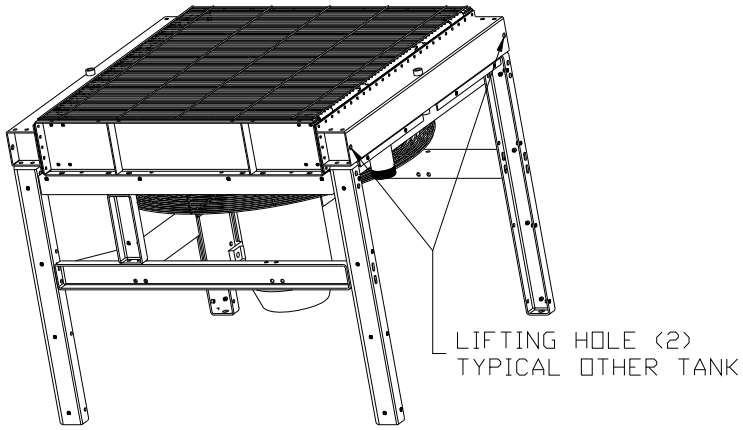


FIG 3A

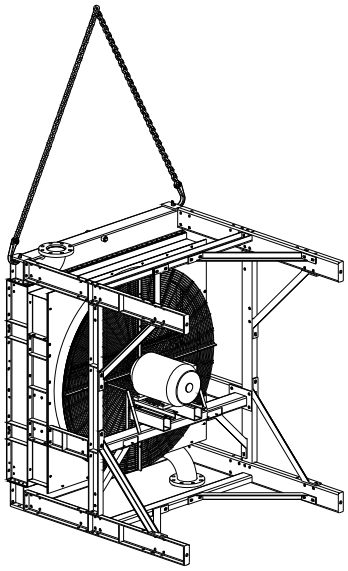


FIG 3B

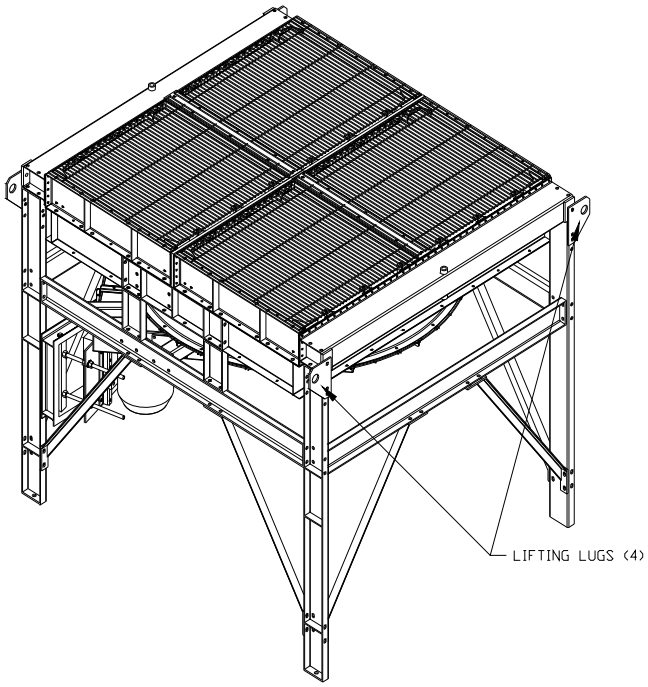


FIG 4A

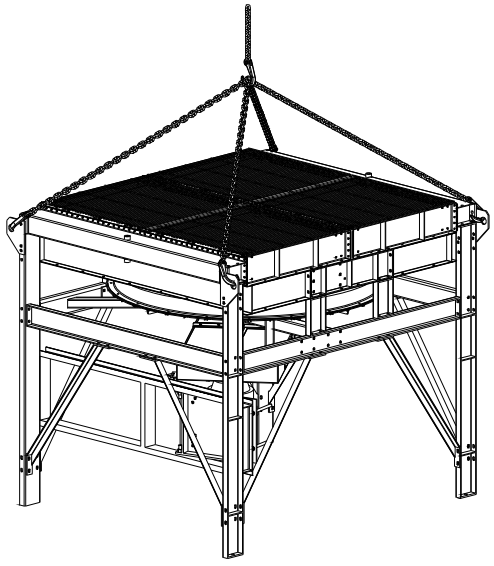


FIG 4B

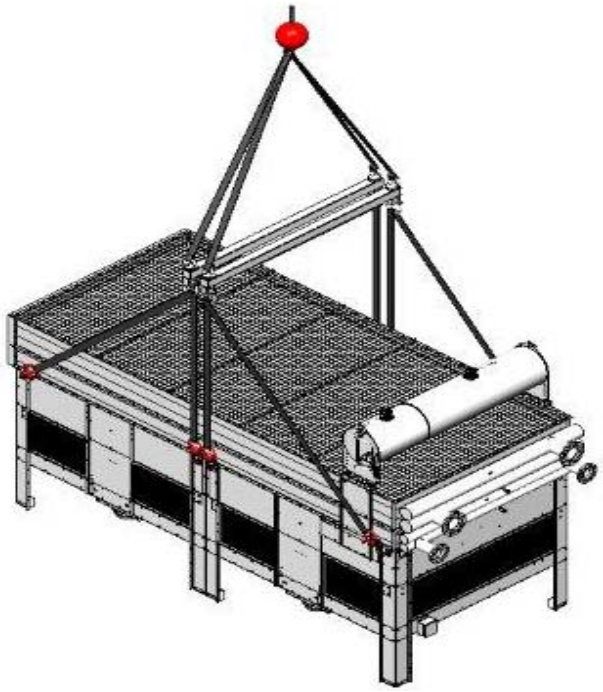


FIG 5

For the HCR product line, the radiator unit should be lifted using the supplied lifting points only (Fig 5). Lifting the radiator assembly using any other point may result in radiator damage or personnel injury. **CAUTION** should be used when lifting the radiator assembly to prevent any rapid movements that may cause the assembly to become uncontrollable. Tether lines should be used to restrict the radiator's movements and to help guide the unit into mounting position.

II INSTALLATION

A) Mounting

Your IEA radiator is designed for locations that allow ample ventilation for airflow. For engine mounted radiators, there should be no obstructions in the unit's air stream other than the engine. If duct work is used on the radiator's air discharge, the cross-sectional area of the duct work should be equal to or greater than the core area. The duct work should be straight or should incorporate large radius turns with no sharp corners. Duct work with small radius turns and/or a cross-sectional area smaller than the core area could reduce radiator performance. IEA should be consulted for recommendations regarding restrictions imposed by ducts and louvers.

The radiator assembly should be placed so that it receives the coolest air possible. Precautions should be taken to allow air to flow freely to and from the radiator unit to prevent recirculation of heated air to the radiator air intake. The radiator should be no closer than one radiator unit width away from any obstruction. Care should be exercised in regards to radiator placement and local prevailing winds.

Local prevailing winds can create dead areas and/or areas of recirculating heated air. These conditions may negatively affect radiator performance.

The radiator assembly should be installed on a level surface with solid footings. After installation, inspect the radiator to ensure no damage occurred during the mounting process. Special attention should be given to the fan during the inspection. Inspect for any nicks, cracks, or shifting of the fan, and gently rotate the fan to assure there is no contact between the fan blades and fan ring before energizing the unit. After installation, it is recommended to flush the radiator before connecting it to the system. All connections to the radiator coil should be self-supported – not hung on the coil. Flexible connections should be used to isolate the coil from any vibration source, thermal growth, or shock loading. Mounting instructions of optional equipment will be detailed and included with each option. The stub shaft must be installed pursuant to the installation instructions established by the manufacturer of the engine. The manufacturer of the stub shaft does not warrant the part in situations, including but not limited to, whereby the part has not been installed in a manner consistent with engine manufacturer instructions and specifications. If a system surge tank is to be used, the surge tank should be plumbed in accordance with the figure representing your specific application located in this manual. If your system is not shown, consult the engine manufacturer about recommendations for plumbing the system surge tank.

Remote radiators are not sized to accommodate engine room air temperature rise or external static restrictions to airflow, unless specified during the initial design stage.

Engine mounted radiators must be mounted to a rigid base. The radiator also must not be allowed to float freely from the engine, unless both engine and radiator are rigidly mounted on a base. If isolation mounts are used, the radiator must be rigidly mounted to the engine, with the engine/radiator combination mounted on tuned isolators.

Vertical core radiators are subject to wind effects. The installation should consider the potentially dramatic effects of prevailing winds on cooling system performance.

CAUTION: IEA standard radiators are designed for a maximum operating temperature and pressure of 225 °F and 20 PSI. Exceeding these limitations will void the warranty.

1.) GENERAL

All IEA final assembly drawings contain mounting dimensions.

2.) EC-N TYPE RADIATORS

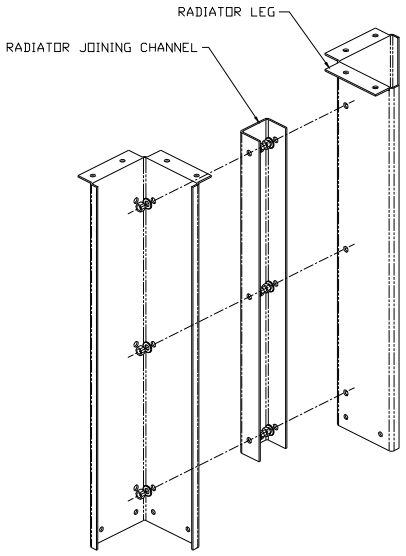
This type of radiator unit should be mounted using the mounting holes provided on the bottom tank ends. If mounting the unit to an engine sub-base, the customer should provide reinforcements connecting the top of the radiator to the engine base (see Fig 7A).

3.) EC-F AND VC TYPE RADIATORS

This type of radiator unit should be mounted using the mounting holes provided on the bottom tank ends and the base channel. If mounting the unit to an engine sub-base, the customer should provide reinforcements connecting the top of the radiator to the engine base (see Fig 7B).

4.) MC, HC, AND HCR TYPE RADIATORS

Horizontal radiators should be mounted with the holes provided at the bottom of each leg. For the HCR product line, if the cooling system requires connecting multiple radiators together, the radiator joining kit should be used for this function. This will correctly space the radiators for use with IEA water connection kits (Fig 6).



RADIATOR JOINING KIT

FIG 6

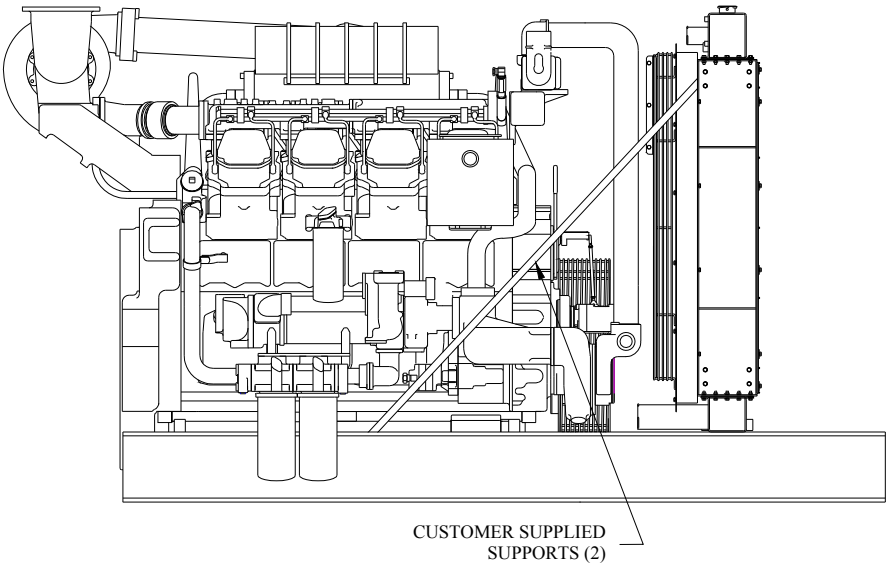


FIG 7A

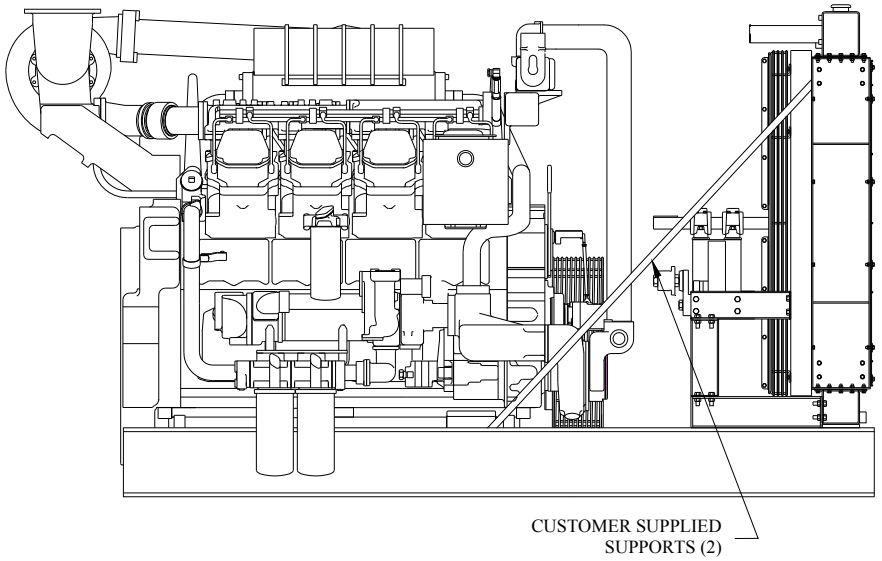


FIG 7B

B.) Mounting Lifting Lugs and Surge Tanks to Horizontal Radiators

On all MC and HC radiators, the customer must install surge tank support brackets. On multiple core radiators, lifting lugs must be installed with the surge tank support brackets prior to mounting the surge tank (see Fig 8 & Figs 9A - 9D). The surge tank fill line should be connected prior to mounting the surge tank (see Figs 10A – 10D). Attach the surge tank using the hardware provided.

To help prevent pump cavitation, it is recommended that the surge tank be mounted on the radiator water outlet (pump suction side). In addition, a ¼" to ½" vent line[1⊥] should connect the radiator inlet piping to the surge tank (see Fig 18, 21 & 22).

The surge tank should be ¼ to ⅓ filled when cold. The additional volume is to accommodate approximately a five percent system expansion when hot and to maintain an envelope of air at the top of the surge tank at all times.

SURGE TANK BRACKET AND LIFTING LUG ASSEMBLY DETAIL

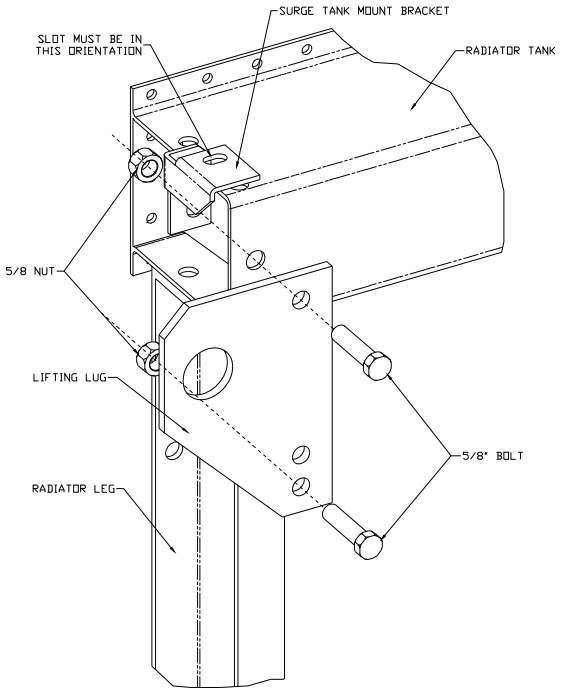


FIG 8

[1] Depending on engine size

[⊥] Engine manufacturer's recommendations must be followed

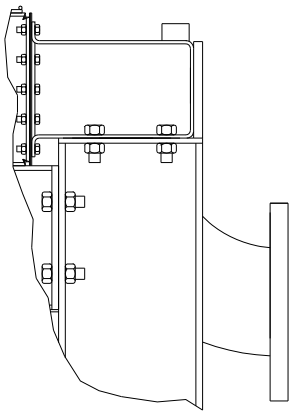


FIG 9A - SIDE VIEW OF TANK
WITHOUT SURGE TANK BRACKET

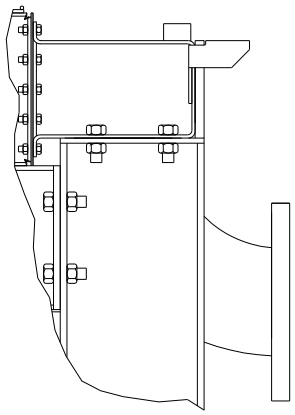


FIG 9B - SIDE VIEW OF TANK
WITH SURGE TANK BRACKET

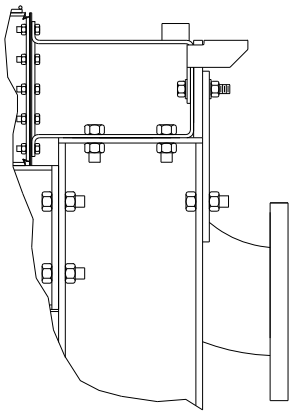


FIG 9C - SIDE VIEW OF TANK
WITH SURGE TANK BRACKET
AND LIFTING LUG

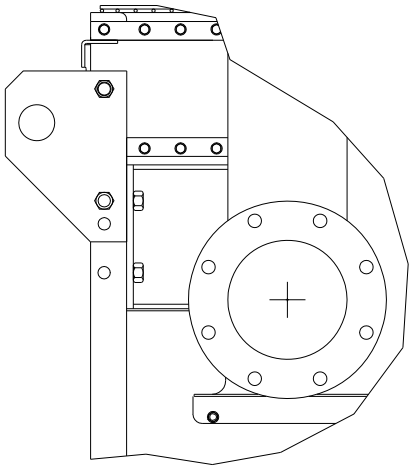


FIG 9D - END VIEW OF TANK
SHOWING LIFTING LUG POSITION

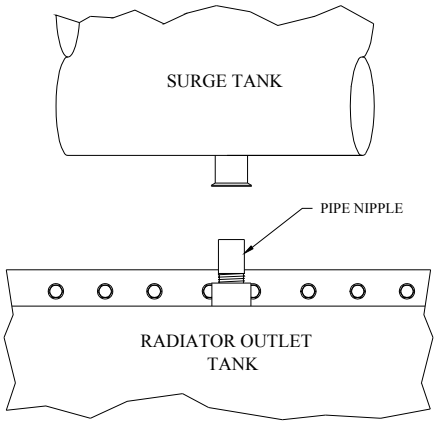


FIG 10A - INSTALL PIPE NIPPLE INTO RADIATOR OUTLET TANK AND TIGHTEN SECURELY.

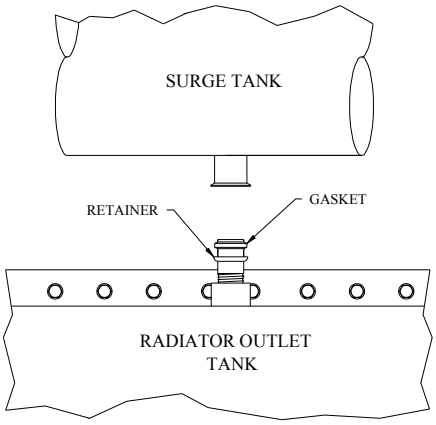


FIG 10B - SLIDE THE COUPLING RETAINER RING AND RUBBER GASKET ONTO THE PIPE NIPPLE.

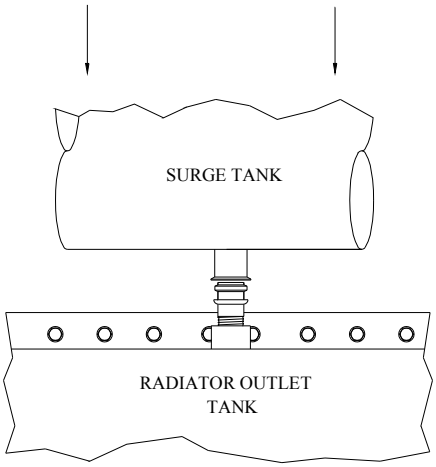


FIG 10C - PLACE THE SURGE TANK ONTO THE PIPE NIPPLE.

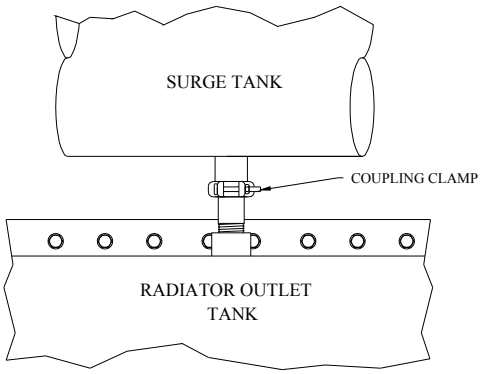


FIG 10D - INSTALL THE COUPLING CLAMP ONTO THE COUPLING AFTER BOLTING THE SURGE TANK TO THE RADIATOR.

SURGE TANK MOUNTING

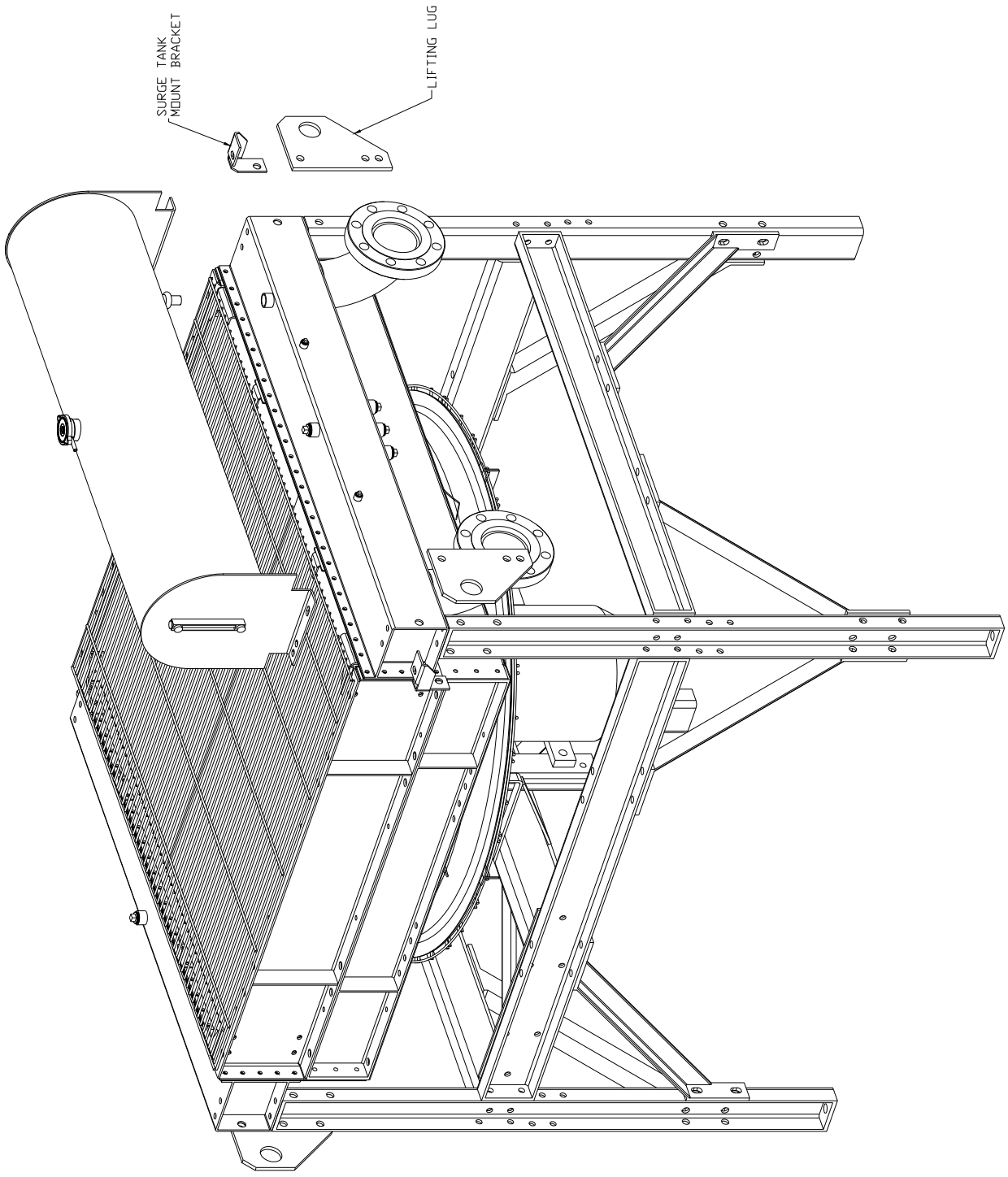


FIG 11

Surge Tank Bulkhead Coupling Detail

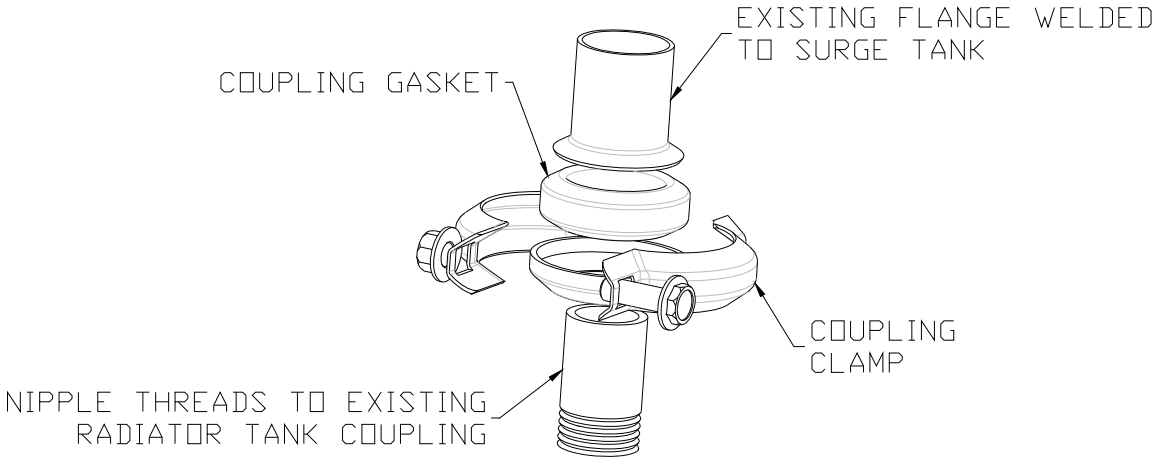


FIG 12

C.) Piping

The following pages show piping schematics for various applications, one of which could suit your needs.

1.) EC TYPE ENGINE-MOUNTED RADIATORS

Generally, all engine-mounted radiators should be piped as shown in Fig. 13. The top tank of the radiator must be the highest point in the system, with a ¼" to ½" vent line from the engine thermostat housing to the radiator top tank[2£]. The final connection to the nozzle on the radiator should be of a flexible material, such as a hose or Flexmaster coupling.

If the radiator top tank has a deaeration baffle installed, the piping schematic used should be Fig. 14. A ¾" to 1 ½" line from the engine water pump to the radiator top tank is required[2]. In addition, a ¼" to ½" vent line from the engine thermostat housing to the radiator top tank. A "fast fill" port is provided on all IEA radiators with a deaeration baffle. This port is used to **INITIALLY FILL** the radiator. After initial start-up, recheck the system coolant level, and top-off if necessary. Connection of a deaeration system should be in accordance with the engine manufacturer's recommendations. Improper connection of lines or improper filling could cause engine damage.

[2] Depending upon engine size
[£] The engine manufacturer's recommendations must be followed

2.) VC TYPE VERTICAL REMOTE RADIATORS

Vertical type remote mounted radiators are piped as shown in Fig 15. The top tank of the radiator should be the highest point in the system.

When a separate surge tank is required with a vertical remote radiator, the system should be piped according to Fig 16. The surge tank should be the highest point in the system, rather than the radiator top tank. A ¾" to 1 ½" fill line is required connecting the bottom of the surge tank to the radiator outlet pipe or pump suction line. Connection to the top tank may cause pump cavitation, depending upon the elevation of the radiator to the engine. If the engine is at a higher point in the system than the radiator, a ¼" to ½" vent line[2] is required from the thermostat housing to the surge tank.

When a vertical remote radiator is to be used with a hot well system, the system should be piped according to Fig 17. The radiator top tank should be the highest point in the system. Flexible connections, pumps, and the hot well are all customer provided. Please note that when a hot well system is used, the radiator inlet is located on the bottom tank. Pumps must be sized to include the static head due to the water column, as well as system dynamic head losses. **It must be noted that hot well systems can damage radiators and void the standard IEA warranty due to thermal and pressure shocking.**

CAUTION must be exercised if city water make-up lines are connected to the system. Pressures in city water lines can exceed the 20 PSI maximum pressure limit of oval tube radiators. Care must be taken to monitor the glycol concentration if straight water is added for make-up.

3.) HC AND HCR TYPE HORIZONTAL REMOTE RADIATORS

When cooling with a horizontal remote radiator, the system should be piped according to Fig 18. A separate surge tank is *required* and must be the highest position in the system. A ¾" to 1 ½" fill line[1] is required from the bottom of the surge tank to the outlet tank of the radiator or pump suction line. The surge tank **must** be plumbed to the outlet tank of the radiator to help prevent cavitation. A ¼" to ½" vent line[1] is required from the surge tank to the radiator inlet tank. If the engine is higher than the radiator, a ¼" to ½" vent line[1] from the surge tank to the highest point in the system is required. It is recommended to install an independent main system fill line for quick filling of the cooling system.

[1] Depending upon engine size

4.) DUAL-LOOP SYSTEM

When cooling with a horizontal remote radiator, the system should be piped according to Fig 22. A separate surge tank is ***required*** and must be the highest position in the system. A ¾" to 1 ½" fill line[1] is required from the bottom of the surge tank to the outlet tank of the radiator or pump suction line. The surge tank **must** be plumbed to the outlet tank of the radiator to help prevent cavitation. A ¼" to ½" vent line[1] is required from the surge tank to the radiator inlet tank. If the engine is higher than the radiator, a ¼" to ½" vent line[1] from the surge tank to the highest point in the system is required. It is recommended to install an independent main system fill line for quick filling of the cooling system.

CAUTION: **When the system piping is higher than the radiator, the system high points must also be vented to the surge tank. This is required in all cases.**

5.) SPLIT CIRCUIT RADIATORS

A split circuit vertically oriented radiator should be plumbed according to Fig 19 & 20. The radiator top tank must be the highest point in the cooling system. A ¼" to ½" vent line may be required from the engine thermostat housing to the jacket water side of the split circuit radiator top tank. If low flow in the aftercooler circuit is apparent, a two-pass aftercooler circuit would be recommended, with the inlet and outlet connections located at the bottom of the radiator.

A split circuit horizontal radiator should be plumbed according to Fig 21. A surge tank is required for each of the split circuits, with both surge tanks plumbed to their respective OUTLET tanks. The surge tanks must be the highest point in the cooling system. A ¼" to ½" vent line is recommended from the inlet tanks of each respective circuit to each surge tank. A ¼" to ½" vent is required from the engine jacket water thermostat housing to the jacket water surge tank when the engine is higher than the radiator. A drain valve should be installed at the lowest point in the each system for system draining.

6.) ALL REMOTE MOUNTED RADIATORS

Flexible connections are required at all radiator connections. All system piping should be externally supported, not hung on the radiator. Strainers are recommended for initial start-up to remove any debris inside the engine or piping system. An auxiliary boost pump may be necessary depending upon the installation system losses, such as pipe length, radiator elevation, fitting types and quantities, etc. Flexible connections, strainers, and auxiliary boost pumps are customer supplied.

[1] Depending upon engine size

PIPING SCHEMATIC FOR RADIATOR
WITHOUT DEARATION SYSTEM

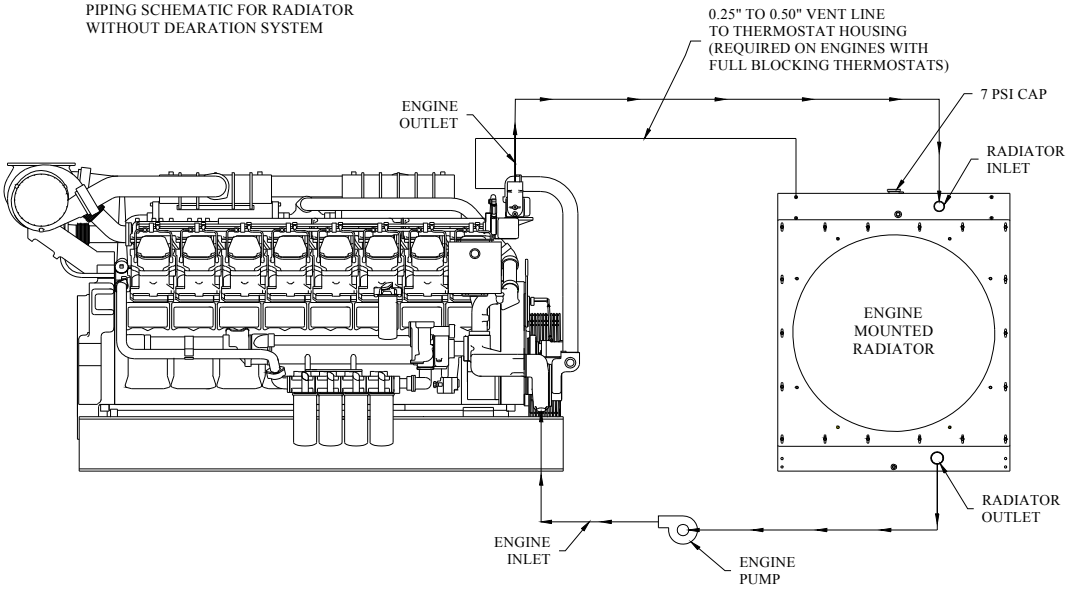


FIG 13

PIPING SCHEMATIC FOR RADIATOR
WITH DEARATION SYSTEM

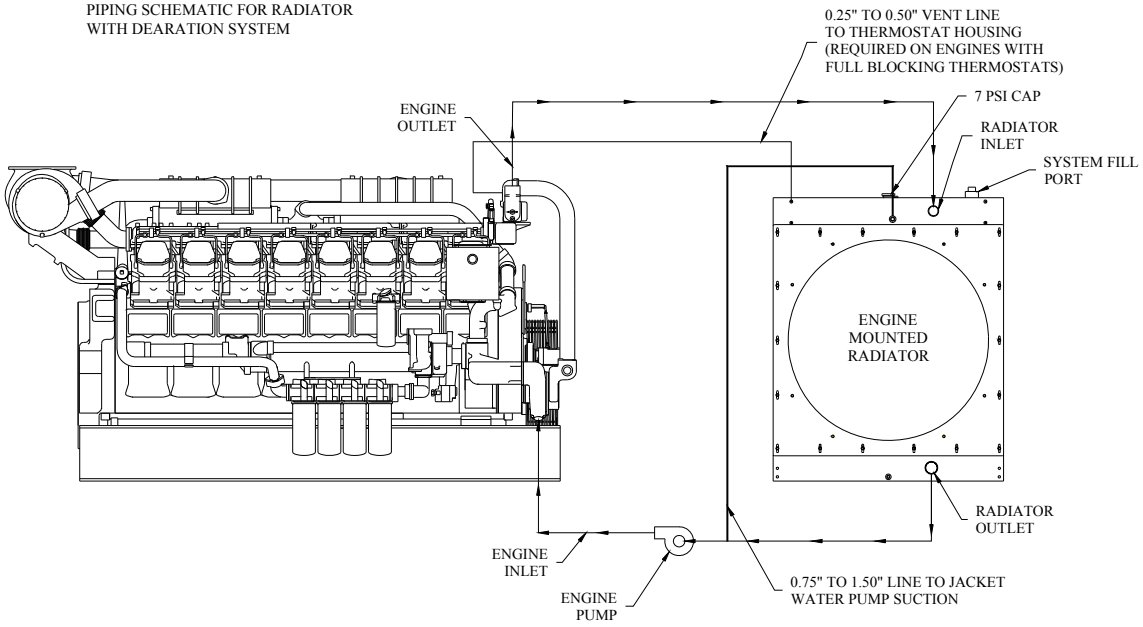


FIG 14

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR
TOP TANK OR SURGE TANK(S).

PIPING SCHEMATIC FOR VERTICAL
REMOTE RADIATOR

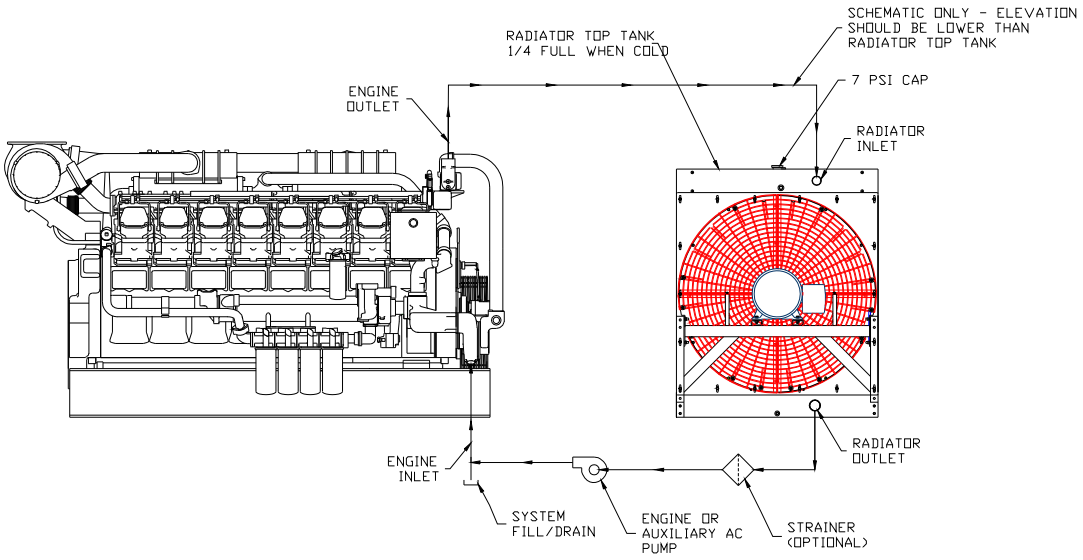


FIG 15

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TOP TANK OR SURGE TANK(S).

NOTE: 1/4" TO 1/2" VENT LINE FROM ENGINE THERMOSTAT HOUSING TO RADIATOR TOP TANK MAY BE NECESSARY.

PIPING SCHEMATIC FOR VERTICAL REMOTE
RADIATOR WITH SEPERATE SURGE TANK

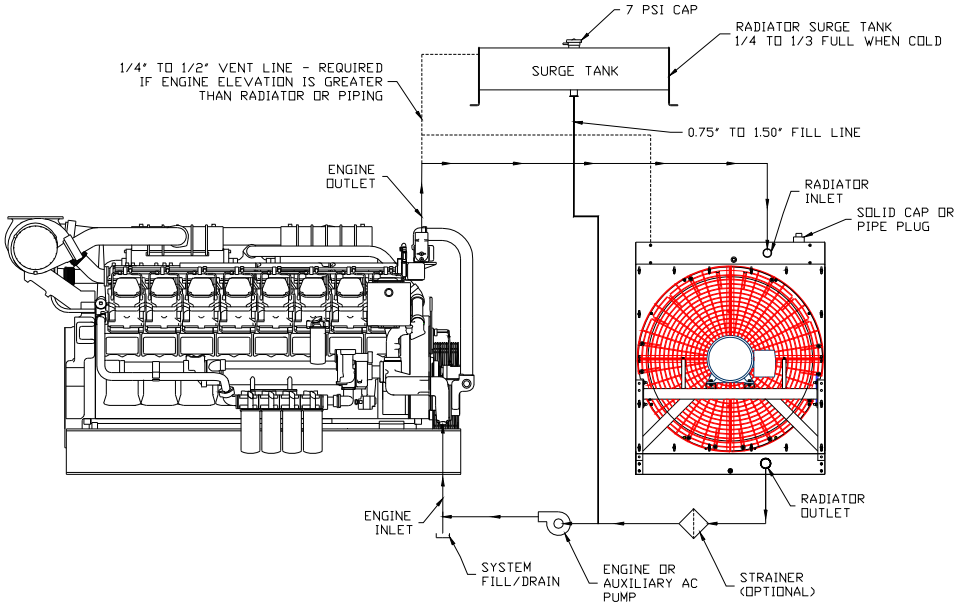


FIG 16

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TOP TANK OR SURGE TANK(S).

PIPING SCHEMATIC FOR VERTICAL
REMOTE RADIATOR WITH
HOT WELL SYSTEM

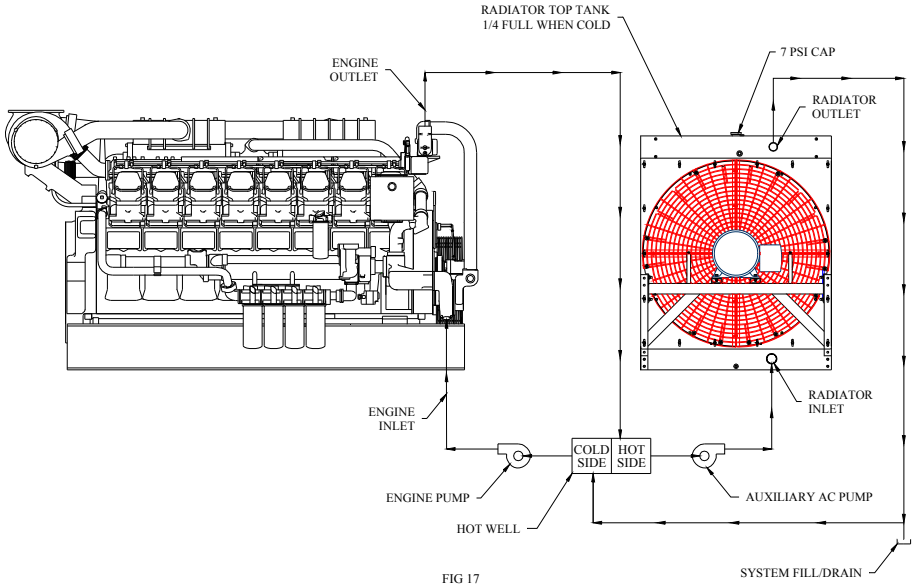


FIG 17

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TOP TANK OR SURGE TANK(S).

NOTE: 1/4" TO 1/2" VENT LINE FROM ENGINE THERMOSTAT HOUSING TO HOT WELL MAY BE NECESSARY.

PIPING SCHEMATIC FOR HORIZONTAL
RADIATOR WITH SURGE TANK

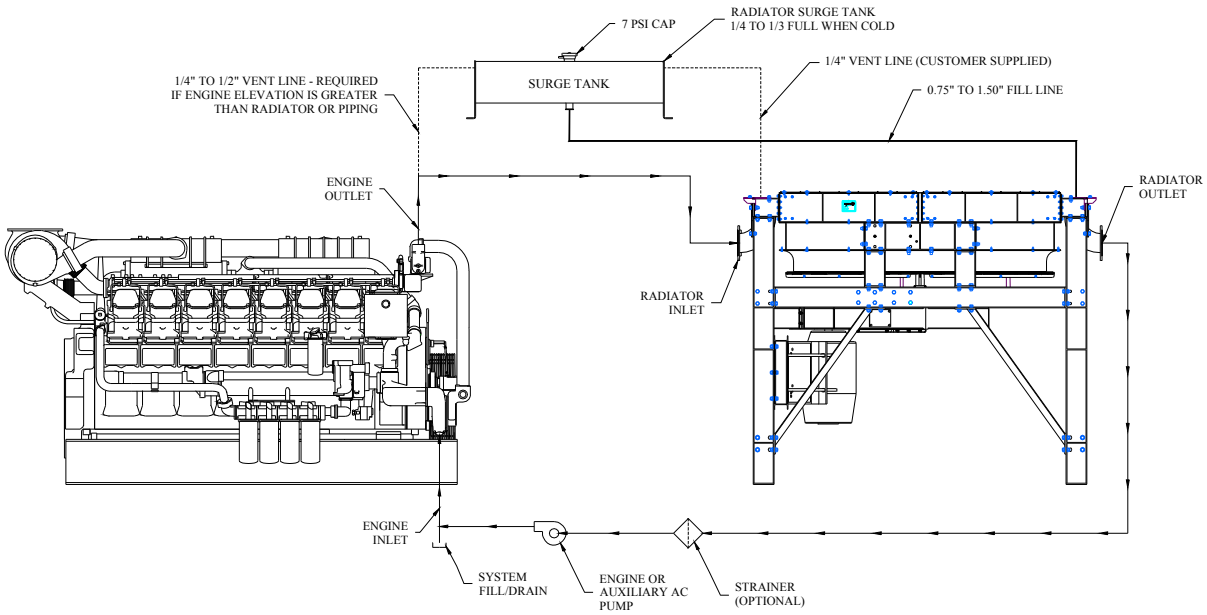


FIG 18

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TANK OR SURGE TANK(S).

PIPING SCHEMATIC FOR VERTICAL
REMOTE RADIATOR WITH
SPLIT CIRCUITS

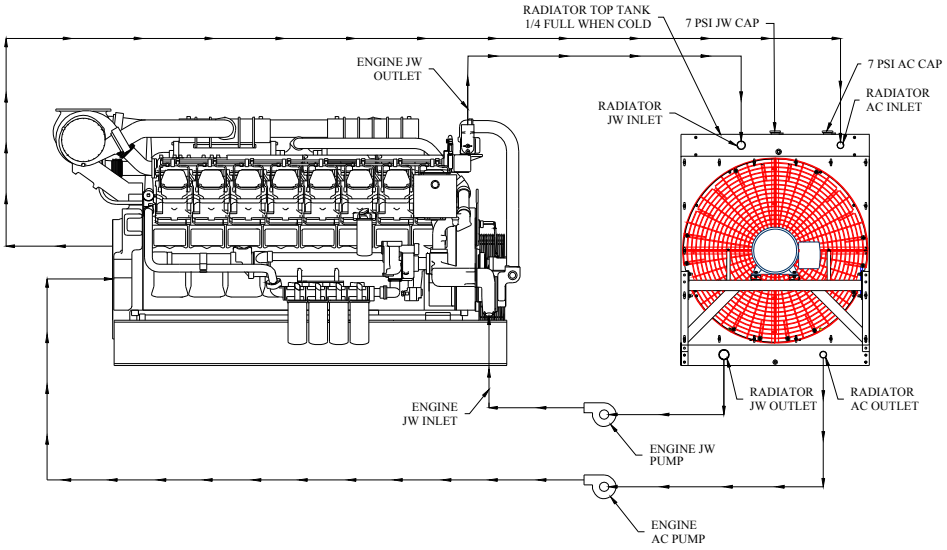
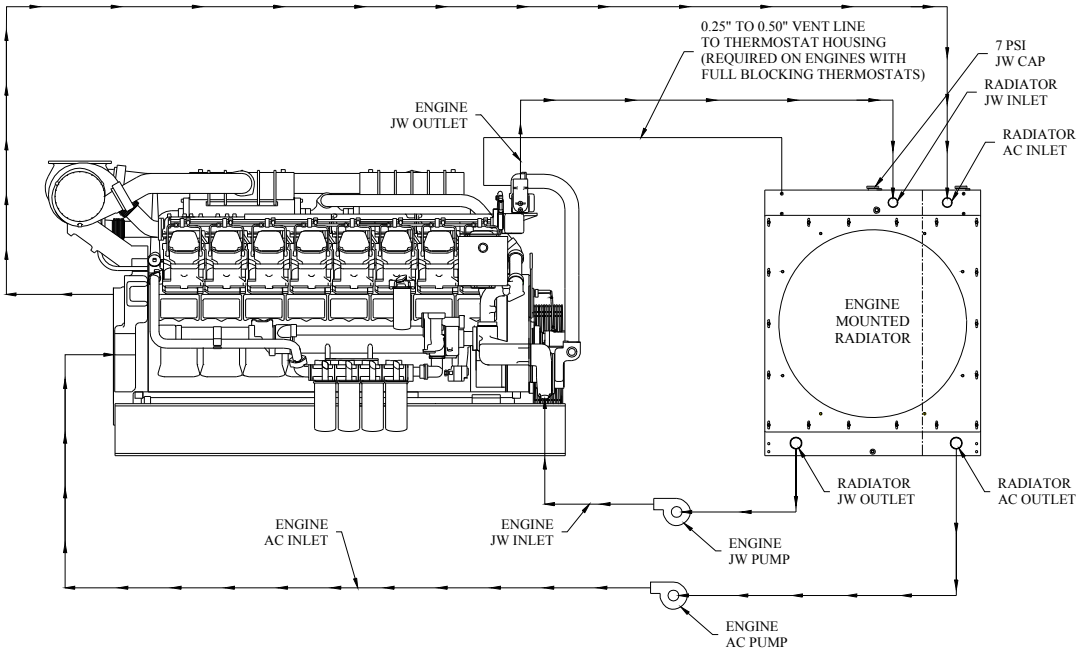


FIG 19

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TOP TANK OR SURGE TANK(S).

NOTE: 1/4" TO 1/2" VENT LINE FROM ENGINE THERMOSTAT HOUSING TO RADIATOR TOP TANK MAY BE NECESSARY.

PIPING SCHEMATIC FOR RADIATOR
WITH SPLIT CIRCUIT SYSTEM



NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TOP TANK OR SURGE TANK(S).

FIG 20

PIPING SCHEMATIC FOR HORIZONTAL
RADIATOR WITH SPLIT CIRCUIT SYSTEM

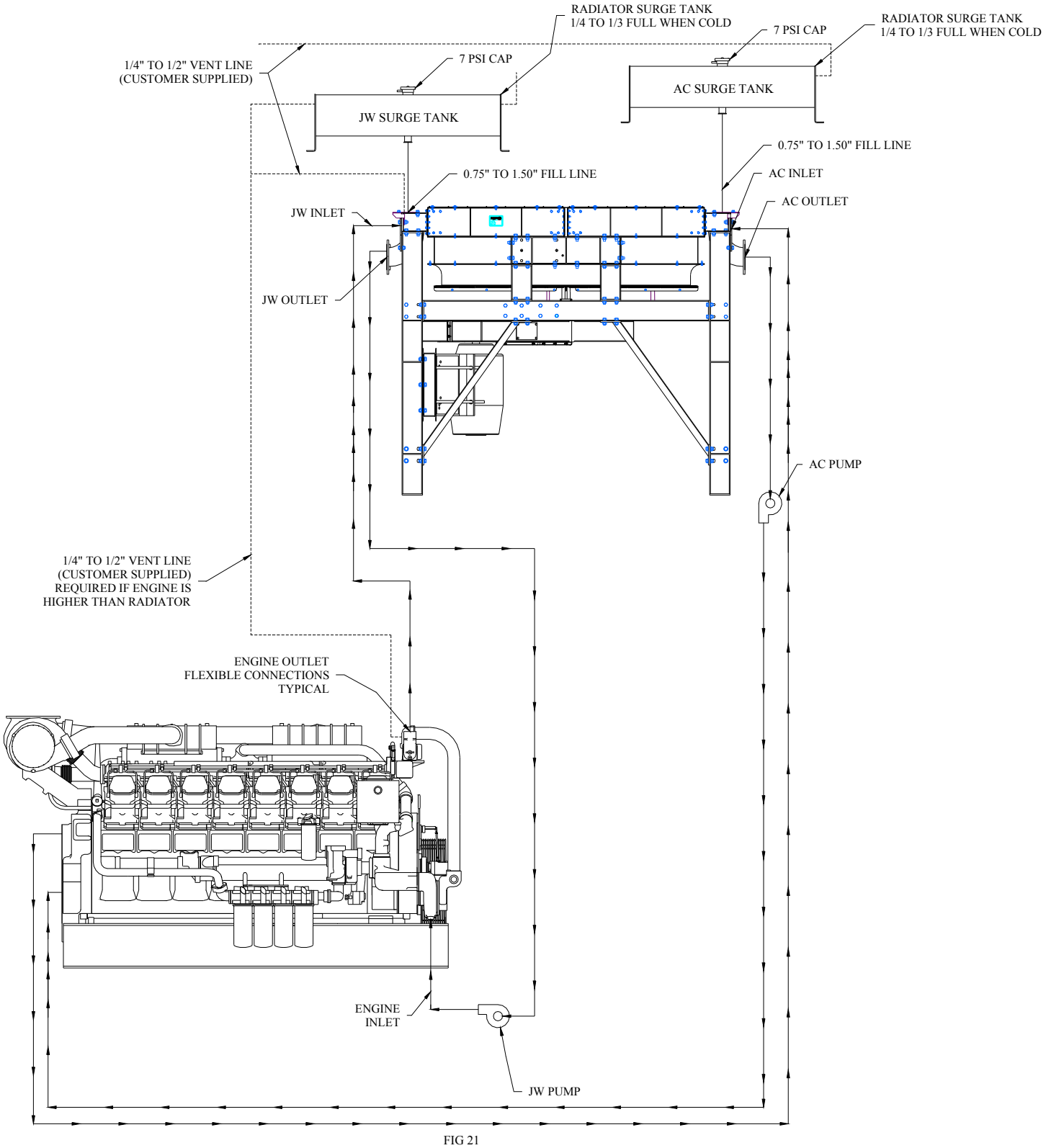


FIG 21

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TANK OR SURGE TANK(S).

PIPING SCHEMATIC FOR HORIZONTAL
RADIATOR WITH DUAL LOOP SYSTEM

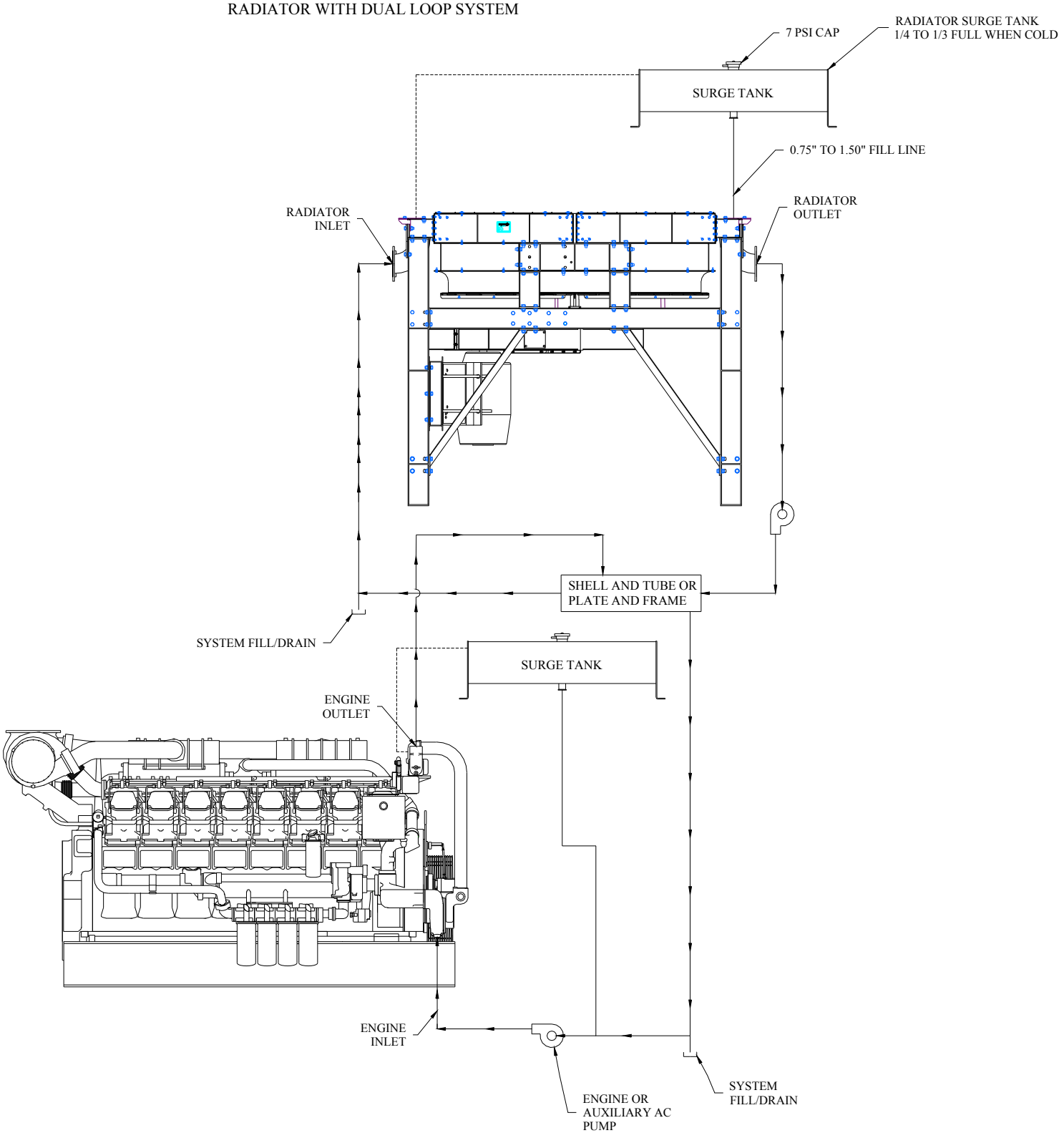


FIG 22

NOTE: ALL PIPING SHOULD BE LOWER THAN THE RADIATOR TANK OR SURGE TANK(S).

D.) Electric Wiring

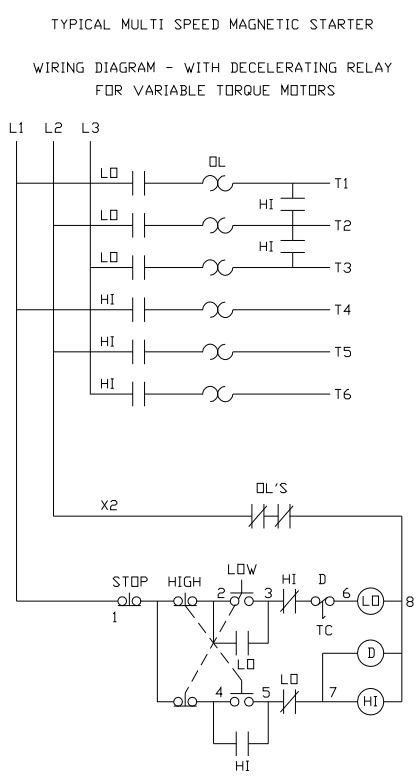
1.) All electric motors are wired per National Electrical Code.

2.) When a temperature switch is used for fan motor starting, it must be connected to the radiator INLET, **not** the radiator outlet for engine jacket water.

3.) A deceleration control modification must be added to multi-speed magnetic starters when using two-speed motors. Deceleration control automatically provides, by use of a timer, motor deceleration when changing from high-speed to low-speed. The timer allows the motor to decelerate from high to a lower speed before automatically restarting the motor in the lower speed.

4.) EPAC motors are supplied with 12 leads. Because of this, two wiring configurations can be used depending upon customer requirements: Y Start and Delta Run. The motor **MUST** be wired in the Delta Run configuration, unless using a Y-Delta starter (see Fig 27, or motor nameplate). **CAUTION:** Motor damage **WILL** occur if the motor is wired incorrectly.

Lack of a deceleration control can lead to burned motor windings, which are not covered under IEA's warranty.



POSITION	L1	L2	L3	TOGETHER
LOW SPEED	T1	T2	T3	
HIGH SPEED	T6	T4	T5	T1 T2 T3

FIG 23

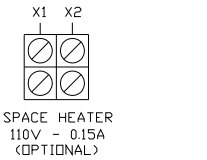
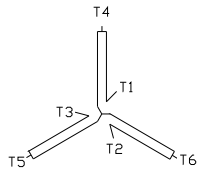
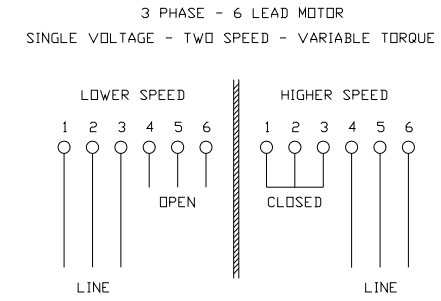


FIG 24



VARIABLE TORQUE MOTOR

FIG 25



ROTATION IS REVERSED BY REVERSING ANY TWO LINE

FIG 26

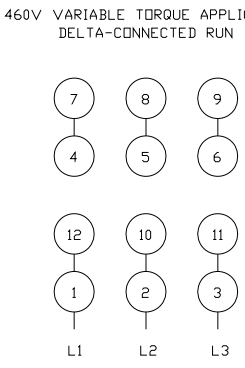


FIG 27

E.) Liquid Level Alarm

If the radiator is equipped with a pre-alarm level gage from IEA, no additional plumbing is necessary. It is not recommended any additional alarms be added to lower points on the radiator, as it can cause pump cavitation if water level type alarms are used.

For a vertical radiator, the installation is shown in Fig 28. The top connection of the gage is plumbed to the lowest acceptable coolant level in the radiator top tank. The lower connection is plumbed to the center of the radiator bottom tank, unless otherwise specified.

For a horizontal radiator, or a vertical radiator with a surge tank, the installation is shown in Fig 29. Both the top and bottom connections are plumbed to the surge tank. The customer mounts and plumbs the level switch connections to existing brackets and fittings. Wiring of the alarm system is shown in Fig 30.

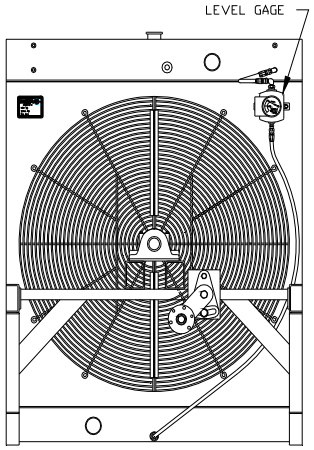


FIG 28

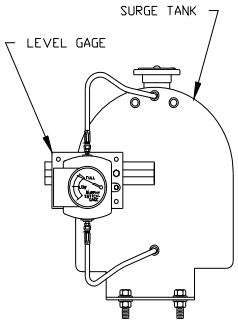


FIG 29

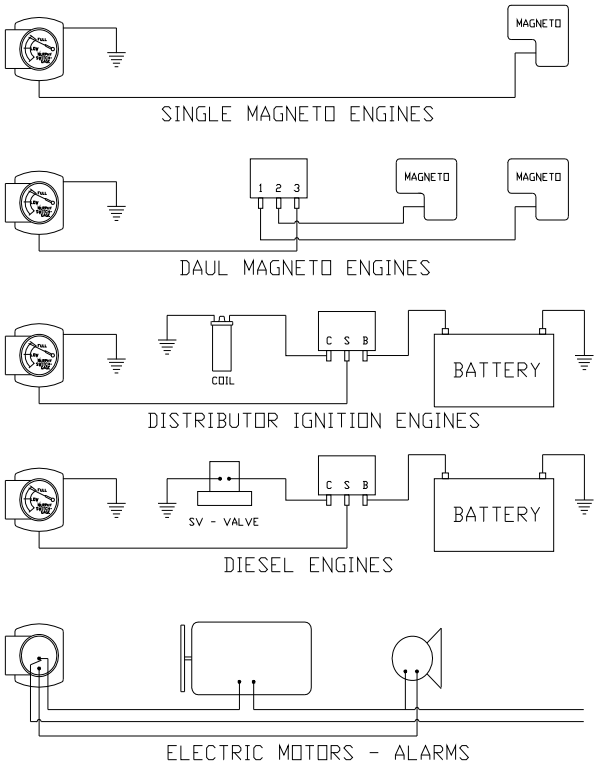


FIG 30

F.) System Filling

It is recommended to not completely fill the radiator or system surge tank to allow for system expansion during warm-up. If the system is completely filled, coolant will be forced out of the overflow hose. After the system cools to ambient temperature, the coolant level has been reduced to the cold fill level, leaving the tank approximately 1/3 full. During system warm-up, the coolant level will increase the top tank volume to 2/3 - ¾ full. This will allow ¼ of the top tank volume to be reserved for air for any system surges. If the radiator is equipped with a fast-fill connection, the radiator should be filled using the fast-fill connection. Filling a radiator equipped with a fast-fill through any other location or device may affect the system fill rate.

G.) Initial Run

Before running the unit, inspect the fan to ensure the fan blades are not contacting any device. Any contact should be corrected before running the radiator. **WARNING: Failure to correct this condition could result in physical damage, injury or death.** This inspection is applicable to all radiator units.

1.) Blower Fans

If the radiator is supplied with a blower fan, verify the fan rotates in a counter-clockwise direction while blowing air away from you, when viewed from the fan side (unless the fan is specified as an opposite, or reverse rotation fan).

2.) Suction Fans

If the radiator is supplied with a suction fan, verify the fan rotates in a counter-clockwise direction while blowing air toward you, when viewed from the fan side (unless the fan is specified as an opposite, or reverse rotation fan).

After initially running the radiator unit, verify belt tension, and adjust as necessary. Inspect the cooling system (radiator, plumbing, customer supplied accessories) for signs of coolant leakage due to relaxing of the system. Tighten all connections as necessary.

III GENERAL MAINTENANCE

Most IEA radiators are nearly maintenance free. Minor maintenance items should be performed to ensure your IEA radiator operates at top performance and to avoid hazards.

A.) Cleaning

Periodically inspect the radiator core for signs of damage, corrosion, and clogging. Straighten any fins that have become bent or have been flattened. If the radiator core appears to be clogged with debris, it should be cleaned using water

and mild detergent that does not react with copper or aluminum. Clean the cores from the AIR DISCHARGE side of the radiator to avoid pushing the debris further into the core. Clean the outside of the radiator, if dirty, to aid in routine inspection of the cooling system. Take care to keep all sight glasses clean to ease system fluid inspection. **CAUTION:** Fan Bearings and Motors should not be sprayed with water or cleaner. Directly spraying could WASH-OUT the Fan Bearing and/or Motor Bearing grease which can lead to premature bearing failure. After washing the radiator, proper lubrication of Fan and Motor Bearings is always recommended. Refer to the Lubrication Section of the IOM. Repair or replacement of the core should be performed by qualified service personnel. If any air filters are used upstream of the core, inspect and replace as needed.

Periodically test coolant fluid samples to assure it is free of sediment, corrosive products, and/or biological contaminants. If automatic air vents are not used in the cooling system, periodic air venting should be performed to remove accumulated air. **CAUTION** should be exercised when venting the cooling system to avoid injury. High pressure and/or high temperature fluids can cause serious injury. If the core is to be stored during the winter, the coolant should be removed and the system thoroughly dried to avoid system damage due to freezing, unless an anti-freeze agent is used in the cooling system.

B.) Lubrication

Radiators using bearings require greasing at an interval dependant upon their usage. The table below shows a lubrication maintenance schedule according to service hours. All motor bearings should be greased with Mobil Polyrex EM polyurea base grease or equivalent. All fan bearings should be greased with Certified Labs Premalube Red aluminum complex base grease or equivalent. DO NOT MIX GREASE TYPES. Radiators requiring different lubricant or lubrication methods will be specified on the radiator drawing.

Table 1

SERVICE HOURS	LUBRICATION FREQUENCY
40 Hours per Year	Every Six Months
18 Hours per Day	Twice a Month
18 Hours per Day (Dirty Environment)	Once Each Week
24 Hours per Day	Once Each Week
24 Hours per Day (Dirty Environment)	Daily

When lubricating pillow block bearings, add greases slowly until it shows slightly at the seals. This indicates proper bearing lubrication. The use of excessive pressure when greasing the bearing can pop the bearing seals. Electric motor bearings should always be kept between ½ and ¾ full. This will ensure proper

lubrication to the motor. Both pillow block and electric motor bearings should be serviced using the maintenance schedule listed above.

C.) Belt Tension

Radiators using V-belt driven fans should have the belt tensions checked regularly. On remote units, belts and sheaves are installed by IEA. On EC-F type units, belts and sheaves may be supplied by IEA, but are mounted by the customer. IEA recommends periodic checks using a tachometer to ensure compliance of fan speed to specifications.

1. All sheaves MUST be aligned correctly to ±0.0625, or premature belt failure may occur. Use a long level to check sheave alignment (see Fig 31).
2. Install the belts onto the sheaves. Tension the belts on the slack-side of the drive with the idler until the correct belt tension is achieved. Follow the operating instructions of the belt tensioning gage being used to measure belt tension.
3. Recheck the belt tension after 24 hours of operation – after the belts have seated in the sheave grooves.

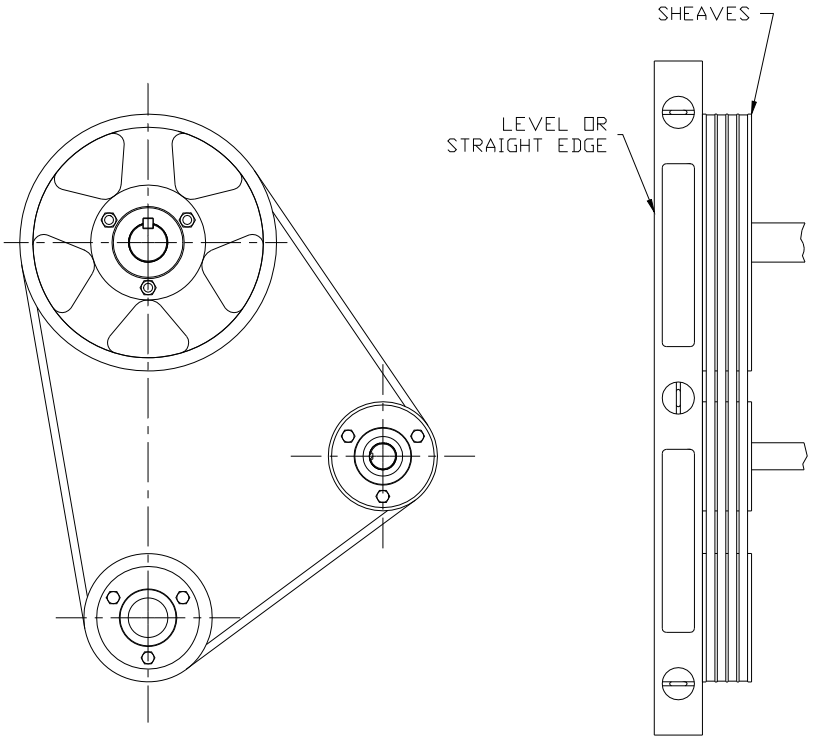


FIG 31

D.) Idler Adjustment (Old Style - Fig 32)

Tightening Belts:

1. Loosen the four 5/8” nuts (A) on the top of the idler assembly.
2. Turn the idler screws (B & C) clockwise, alternating tightening every two turns.

DO NOT use an air impact wrench on the adjustment screws.

Notice the outside belts cause the idler shaft to misalign. This reduces the tension on the inner belts, and should be corrected. To correct this situation, turn the inside idler screw (C) counter-clockwise until the idler shaft is correctly aligned.

3. Repeat step two if necessary to achieve correct belt tension.
4. Tighten the four 5/8” nuts (A) to the correct torque.

Note:

1. It is very important for the sheaves to be in alignment to ensure proper belt wear.
2. DO NOT loosen the four bolts (D) holding the upper bearings to the tapped plate (E). This assembly is independent of the 5/8” nuts (A).
3. Check the torque on the bearing set screw (F). Proper torque is 19 ft. lbs.
4. Check the torque of the four bolts (G).
5. Periodically grease the idler adjustment screws (H) to ensure belt adjustment ease.

Loosening Belts:

1. Loosen the four 5/8” nuts (A) on the top of the idler assembly.
2. Turn the idler screws (B & C) counter-clockwise, alternating tightening every two turns.

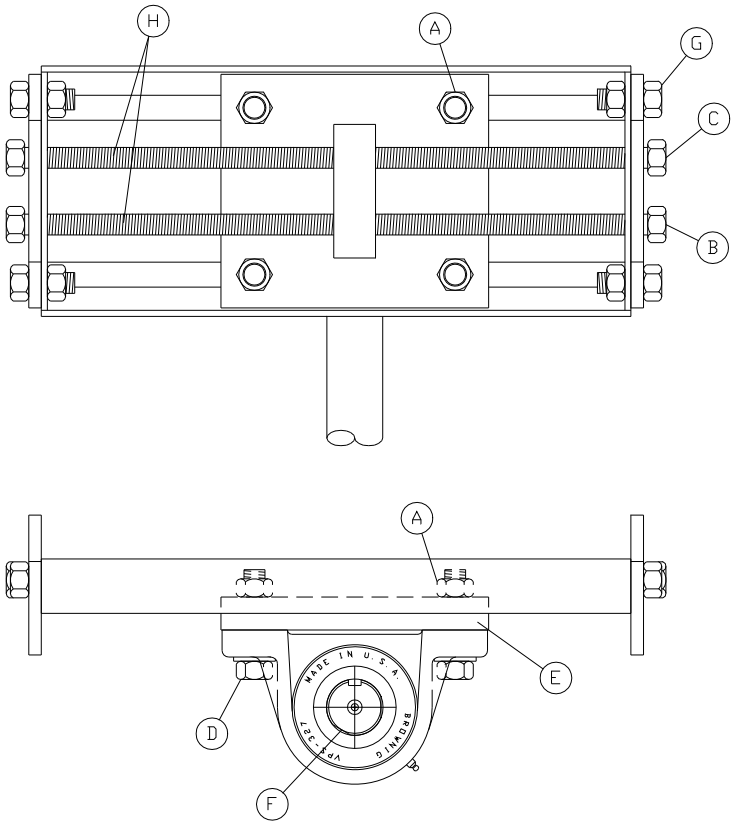


FIG 32

E.) Idler Adjustment (New Style - Fig 33)

Tightening Belts:

1. Loosen the two ¾” bolts (A) on the back of the idler assembly.
2. Loosen the jamb nut (C) on the idler adjustment screw.
3. Turn the idler adjustment nut (B) clockwise.
4. Repeat step three if necessary to achieve correct belt tension.
5. Tighten the two ¾” bolts (A) to the correct torque.

Loosening Belts:

1. Loosen the two ¾" bolts (A) on the back of the idler assembly.
2. Loosen the jamb nut (C) on the idler adjustment screw.
3. Turn the idler adjustment nut (B) counter-clockwise.

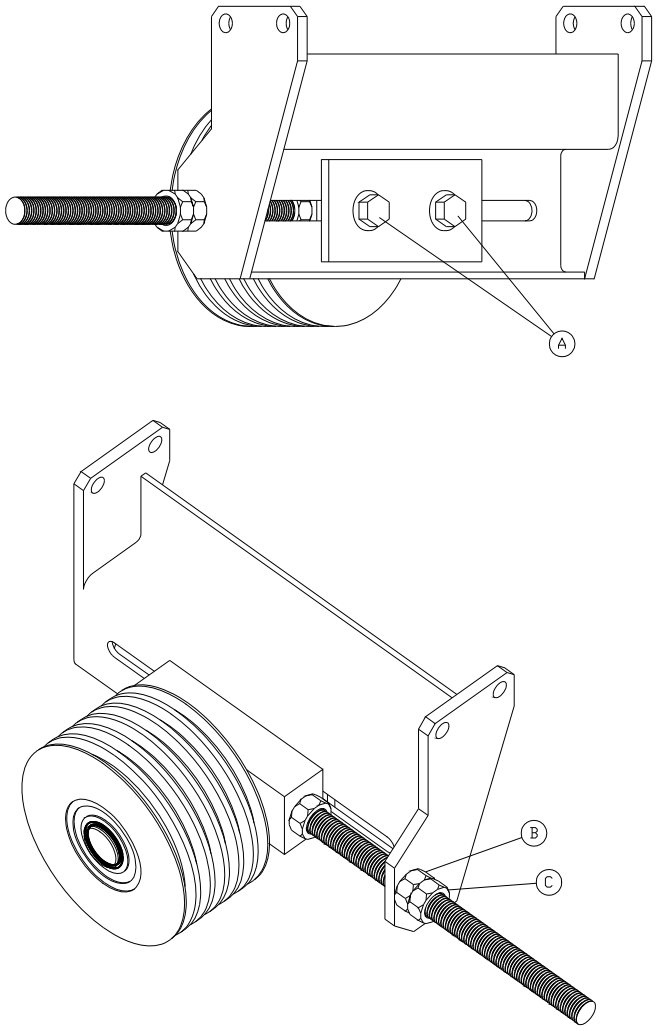


FIG 33

F.) Bolts

Almost every component on an IEA radiator is bolted for ease of maintenance and service. Bolt torque should be routinely checked to verify all bolts are tight, especially the bolts joining the top tank to the core header. All tank to header bolts should be torqued to 25 ft. lbs., while all other bolts are not to exceed their standard dynamic assembly torque.

IMPORTANT: Upon the initial fill of the radiator, slight coolant seepage may appear around the tanks. This is due to drying of the core gaskets during shipment. If this occurs, allow the gaskets to soak over night, then retorque the tank to header bolts to the specified torque. Loosen the corner reinforcement bolts which bolt to the sidemember. Begin retorqueing the head bolts from the center, and move outward to the end of the tank. All header bolts must be retorqued during this procedure - partial retorqueing will promote header leakage. Tighten the corner reinforcement bolts.

TABLE 2: HUB BOLT TORQUE CHART

		TORQUE	
HUB TYPE	BOLT TYPE	IN. LBS.	FT. LBS.
H	¼-20 X 5/8	95	8
SH, SDS	¼-20 X 1 3/8	108	9
SD	¼-20 X 7/8	108	9
P1, P2, P3	5/16-18 X 1	192	16
SK	5/16-18 X 2	180	15
Q1, Q2, Q3	3/8-16 X 1 ¼	348	29
R1, R2	3/8-16 X 1 ¾	348	29
SF	3/8-16 X 2	360	30
S1, S2	½-13 X 2 ¼	840	70
E	½-13 X 2 ¾	720	60
F	9/16-12 X 3 5/8	920	75