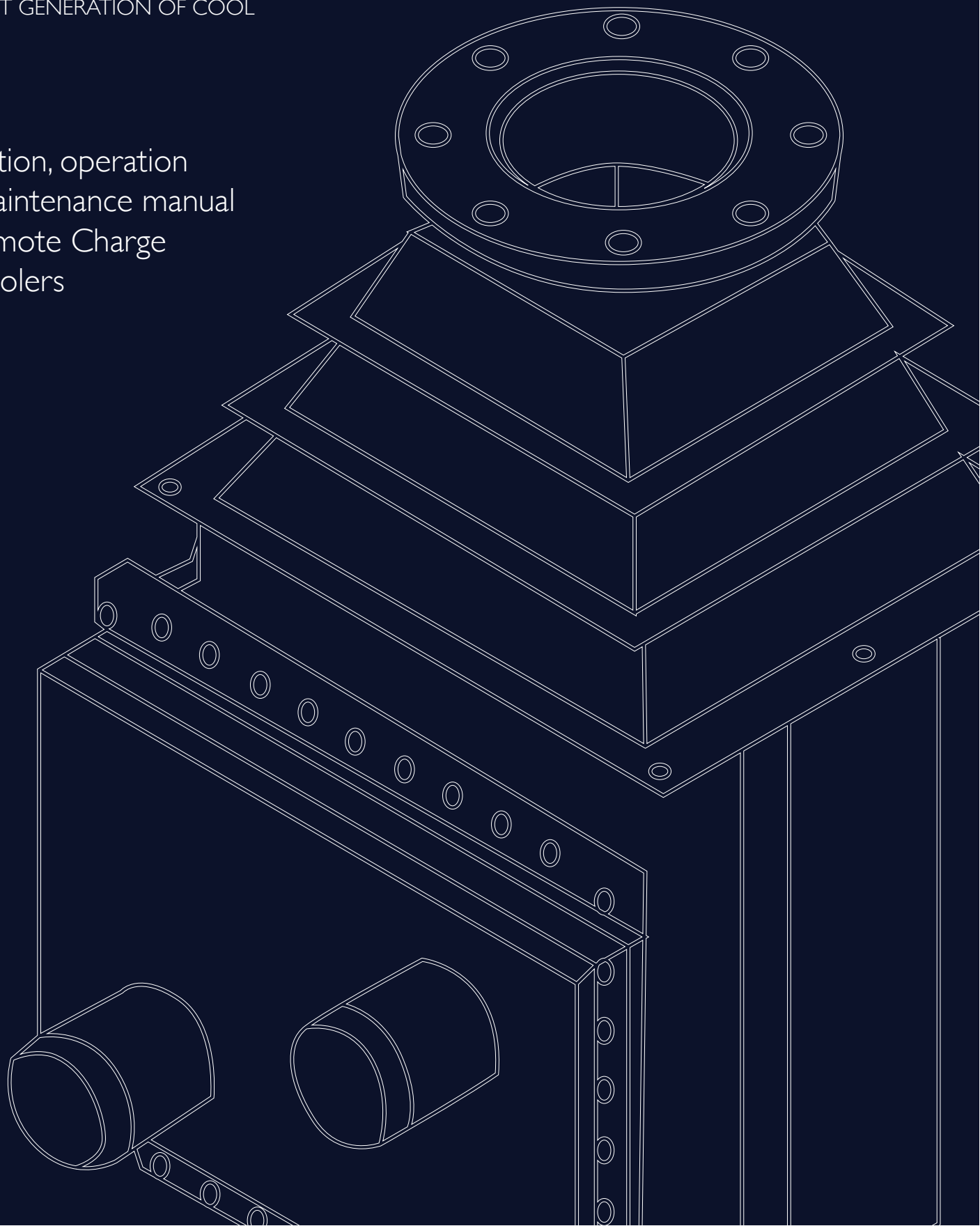
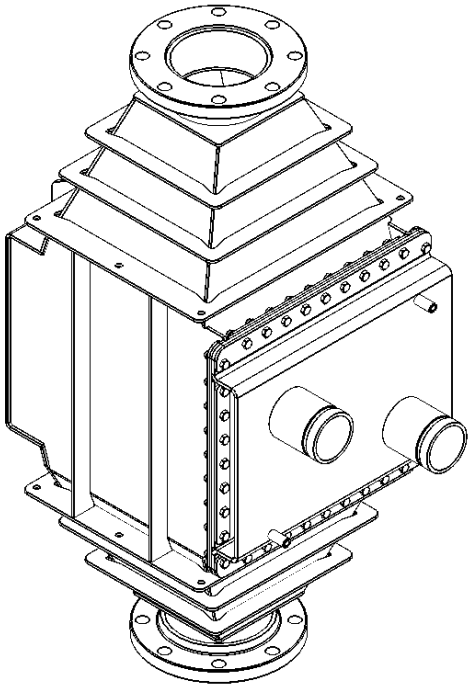
THE NEXT GENERATION OF COOL

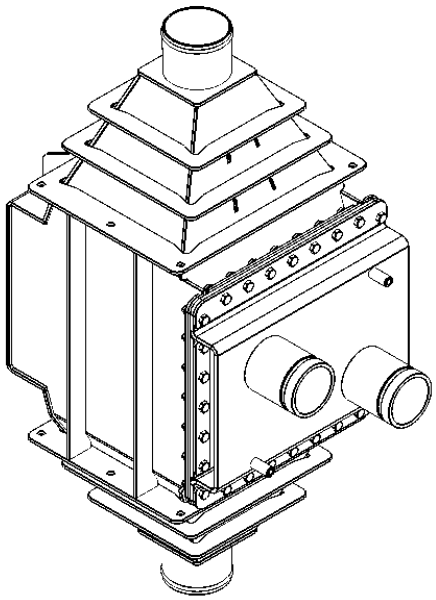
Installation, operation and maintenance manual for Remote Charge Air Coolers



INSTALLATION, OPERATION AND MAINTENANCE MANUAL FOR Remote Charge Air Coolers



1.5 – 2.5 MW Series



0.5 – 1.5 MW Series

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Figures & Tables

1. SAFETY INSTRUCTIONS

NOTE: Read this Operator's Manual carefully. Follow all safety precautions and operating recommendations to ensure safe and trouble free operation of the RCC unit.

1.1 Safe Operating Practices

1.1.1 The RCC has unique weight and balance characteristics. Before interacting with the RCC assembly, become familiar with it.

1.1.2 Observe all safety laws and regulations applicable to the area of operation.

1.1.3 Replace any safety decals that become damaged or illegible. Contact IEA directly to order replacement decals.

1.1.4 Any modifications to the RCC that are not performed by, or under the guidance of authorized IEA personnel could affect the safety, performance or durability of the RCC. If problems result, this may violate local regulations, and/or service may not be covered under the warranty.

1.1.5 To ensure safe and trouble free operation, always purchase genuine IEA replacement parts from IEA directly. Using replacement parts from other sources may void the warranty.

1.1.6 To prevent bodily harm, it is the responsibility of the end user to fully insulate all hot surfaces, as noted, in the system (**Surface temps can approach 500° F**)

1.1.7 To avoid back injury, use lifting aids (i.e. forklift, crane, chain pull, etc.) whenever shifting, adjusting, moving, mounting or otherwise manipulating any components of or the RCC assembly as a whole.

1.1.8 **WARNING: Over pressurization of product can result in premature product failure, engine damage and potential harm to standers-bye. See Tables 8.1 & 8.2 for safe operating limits.**

1.1.9 **NEVER INSTALL OR MAINTENANCE DURING ENGINE OPERATION!**

1.2 Safety Logos

LOGO	DESCRIPTION
	Pinch Point Hazard
	Hot Surface Hazard
	Do Not Lift Point

1.3 Charge Air Cooler Pipe Kit and Coolant Connections

1.3.1 Coolant and air lines can fail because of physical damage, age, vibration and exposure to extreme environments. Check and tighten hoses, lines and connections regularly and replace them if necessary.

1.3.2 Ensure all hose containment clamps are installed and functional before, during and after operation.

1.3.3 Ensure all lines are free from obstruction, crossover or physical contact with other lines in the system.

1.4 Safety Attire

Whenever working with the RCC:

1.4.1 Wear safety glasses.

1.4.2 Wear hearing protection.

1.4.3 Wear sturdy footwear that fully covers feet.

1.4.4 Wear protective gloves to protect against burns and cuts.

2. MANUAL SCOPE

2.1 This manual is provided to assist customers in the installation, operation, and maintenance of Remote Charge air Coolers (RCCs).

2.2 This manual pertains to the installation, operation and assembly of the RCC units only. Please refer to supplied drawings or customer service for instructions pertaining to accompanying components (i.e. containment clamps, coolant connections, air connections, etc.).

2.3 This manual covers single unit RCC installations only. Each RCC Series has distinct IOM instructions. Please refer to installations drawings per model as supplied by IEA. A complete list of the RCC product line can be found in **Appendix I**.

2.4 RCCs require additional components such as a remote radiator, a coolant pump and a coolant manifold (**See Figure 3.1**). Installation of THESE components is NOT covered in this manual.

2.5 Proper system vent and valve placement and installation is the responsibility of the installer.

3. RCC DESCRIPTION & APPLICATION

The RCC is a stand alone air cooling unit used to cool hot turbocharger air prior to being introduced to the engine's combustion process. An RCC is used when the radiator cannot be mounted near the engine (basement of a building, for example). Below are two diagrams: **Figure 3.1**, a general installation platform and **Figure 3.2**, a list of the components required with the RCC unit as defined in this document.

Figure 3.1: RCC Installation View

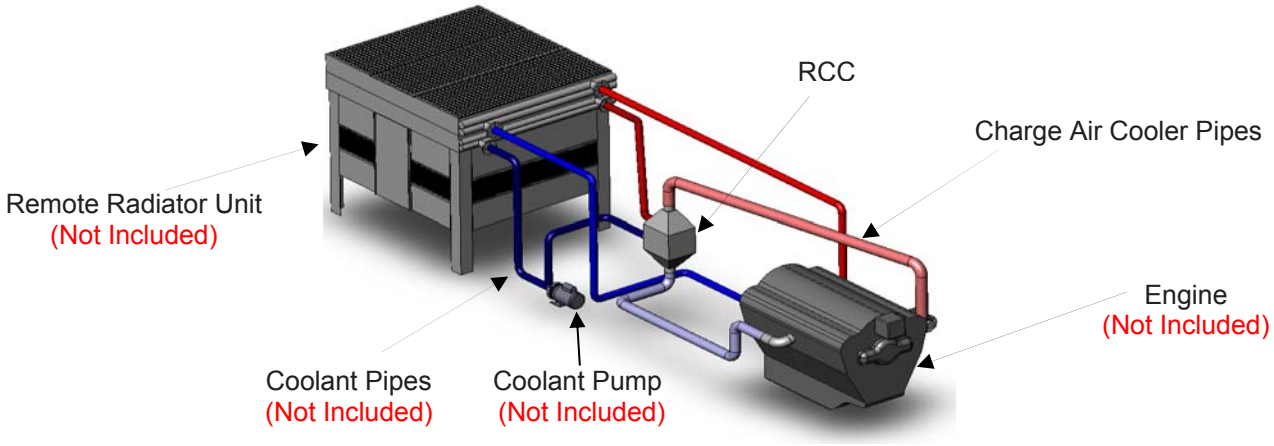
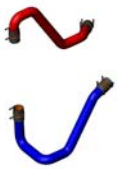
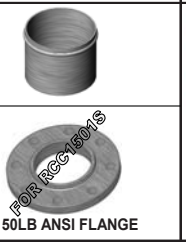


Figure 3.2: Assembly Components Required Per Standard Installation (RCC – 0.5 MW)

RCC	FRAME ASSEMBLY	CHARGE AIR COOLER PIPE KIT	VICTAULIC COUPLING	CAC PIPE CONNECTIONS	CONDENSATE DRAIN
				 6" 150LB ANSI FLANGE	

CONNECTION CONTAINMENT	COOLANT MANIFOLD	HEAT BLANKETS
		

4. PRE INSTALLATION

4.1 Receiving and Inspection

4.1.1 Packing Slip & Bill of Lading

4.1.1.1 Check packing slip/bill of lading to verify all items have been received. Refer to supplied drawings for list of included parts.
4.1.1.2 Items not received that are on the packing slip shall be reported to carrier.
4.1.1.3 Items not on the packing slip that should have been received shall be reported to an IEA representative per contact info at the bottom of page.

4.1.2 Damage

4.1.2.1 Check RCC and/or accessories for deformation, dents, fractures or any other type of damage – particularly around the water connections.
4.1.2.2 Refer to **Section 7** for inspection points.
4.1.2.3 Any damage must be noted on bill of lading before carrier's departure.
4.1.2.4 Report and file damage claim with carrier or IEA (per contact info below) immediately.
4.1.2.5 IEA is not responsible for unreported damage.

4.1.3 Items Shipped with the RCC

4.1.3.1 Items shipped with the RCC (i.e. CAC Pipe Kit and Frame Assembly) need to be installed during the mounting of the RCC. Keep them with the RCC at all times.
4.1.3.2 Installation instructions are located in **Section 5** of this manual.

4.2 Storage

4.2.1 RCC should be stored under a weather resistant canopy or indoors.
4.2.2 Drain RCC of any coolant or other liquids and store dry.
4.2.3 Protect RCC from damage during moving, lifting and storing.
4.2.4 Ensure unit is secured from falling or collision during moving, lifting and storing.
4.2.5 Keep rubber caps over ports, secured in place.
4.2.6 Secure RCC accessories to shipping skid to avoid misplacement.

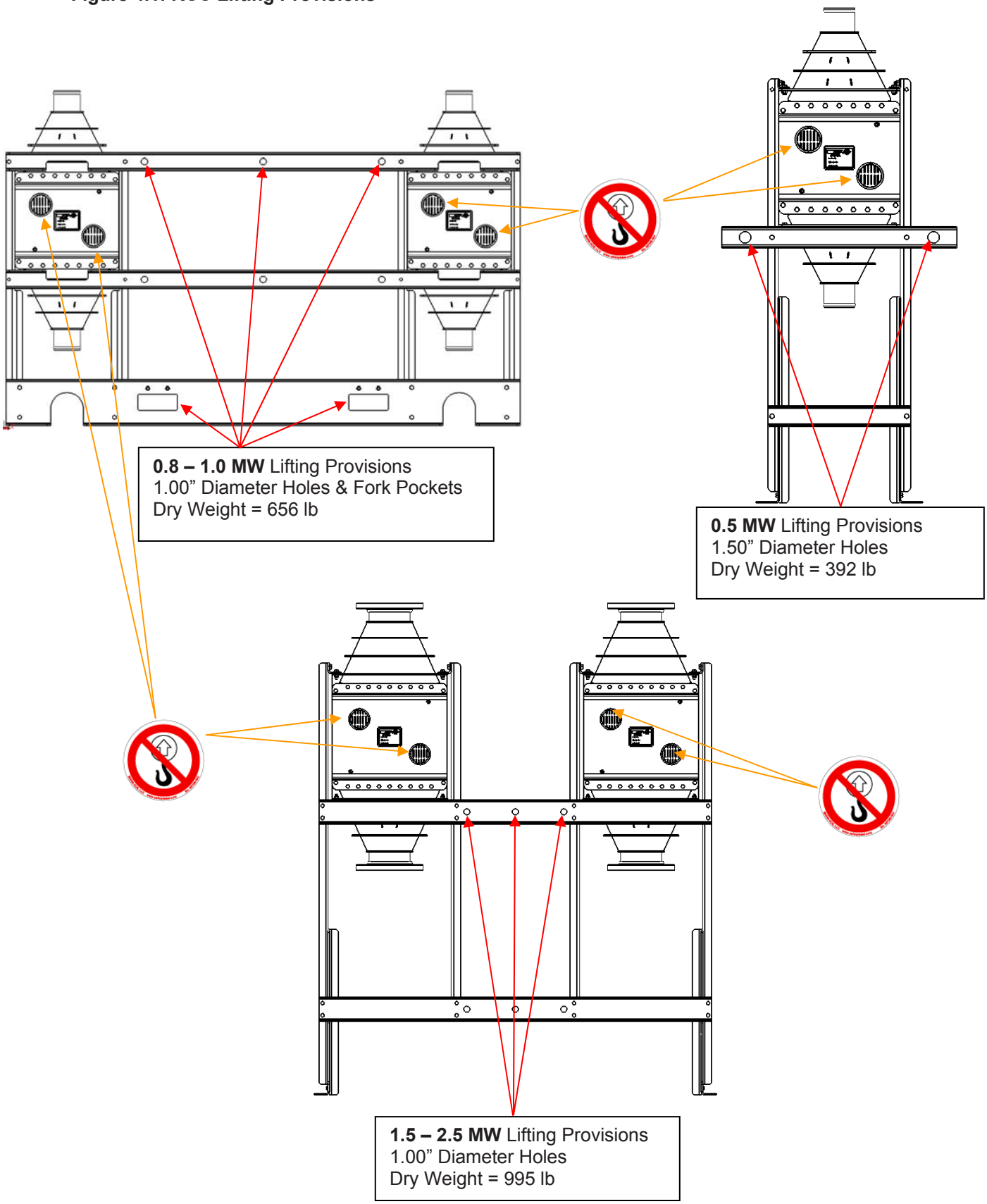
4.3 Transporting and Lifting

4.3.1 Transport on shipping skid with forklift when possible.
4.3.2 Use proper hoisting equipment for the size and weight of the RCC (**See Figure 4.1**).
4.3.3 Use the lift points provided (**See Figure 4.1**).
4.3.4 Rapid movements while lifting will cause the RCC to become uncontrollable.
4.3.5 Use tether lines to restrict RCC movement and help guide unit into position where required.
4.3.6 Use lifting points provided if using an overhead crane (**See Figure 4.1**).
4.3.7 **CAUTION: DO NOT LIFT FROM VICTAULIC/CAC PIPE CONNECTIONS** (**See Figure 4.1** for proper lifting locations).

4.4 Pre-Installation Procedure

4.4.1 Remove RCC and it's components from shipping container (**See Section 4.1**).
4.4.2 Using water, purge all tubes, hoses, pipes and housings of any debris.
4.4.3 Drain RCC tanks and housings of any liquid.

Figure 4.1: RCC Lifting Provisions



5. INSTALLATION

5.1 General Installation Process

5.1.1 **IEA Best Practices dictates RCCs should be installed within 5 feet of engine to ensure intended performance.**

5.1.2 The use of isolator pads is recommended. Use isolators adequate for listed RCC dry weights and mounting locations (**See Figure 4.1**).

5.1.3 Locate the RCC and Frame Assembly per site installation drawing.

5.1.4 Loosely attach Charge Air pipes (**See Figure 3.2**).

5.1.5 Adjust RCC Housing location in Frame Assembly to improve air connection alignment (**See Figure 5.1**).

5.1.6 Tighten mounting bolts which connect RCC Housing to the Frame Assembly (**See figure 5.1**).

5.1.7 Tighten bolts on Charge Air pipe connections (**See Figure 3.2**).

5.1.8 Install Containment Connections to Charge Air Pipes per supplied installation drawing.

5.1.9 Plumb coolant lines (**See Figures 5.4 & 5.5**).

5.2 Horizontal and Vertical Adjustment

RCCs have the ability to adjust up to 0.5” horizontally and 12” vertically.

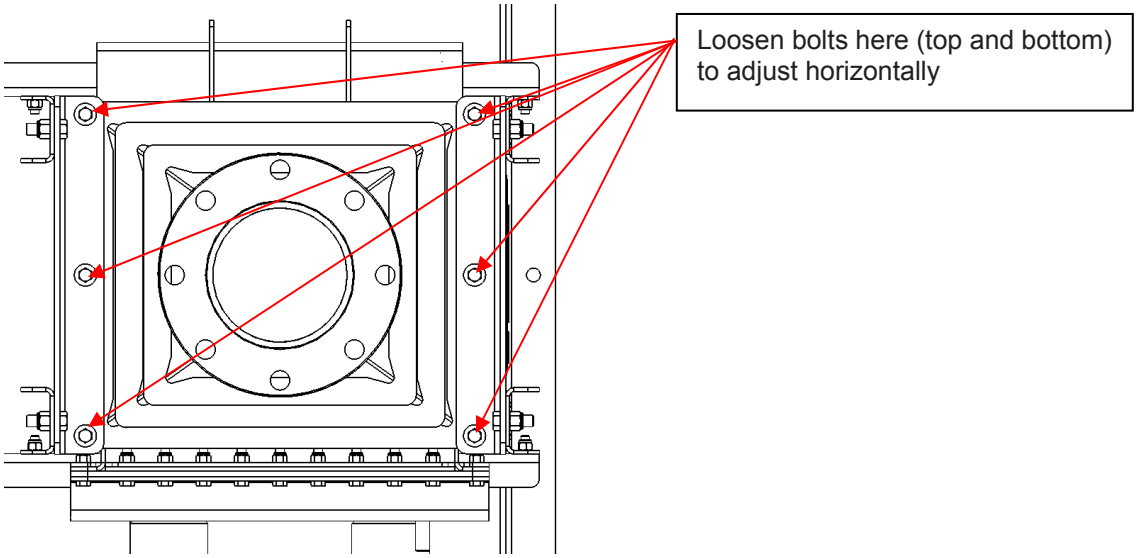
5.2.1 Horizontal Adjustment

5.2.1.1 Loosen bolts (**See Figure 5.1**).

5.2.1.2 Position RCC in alignment with Charge Air Pipes.

5.2.1.3 Tighten bolts.

Figure 5.1: Horizontal Adjustment Diagram

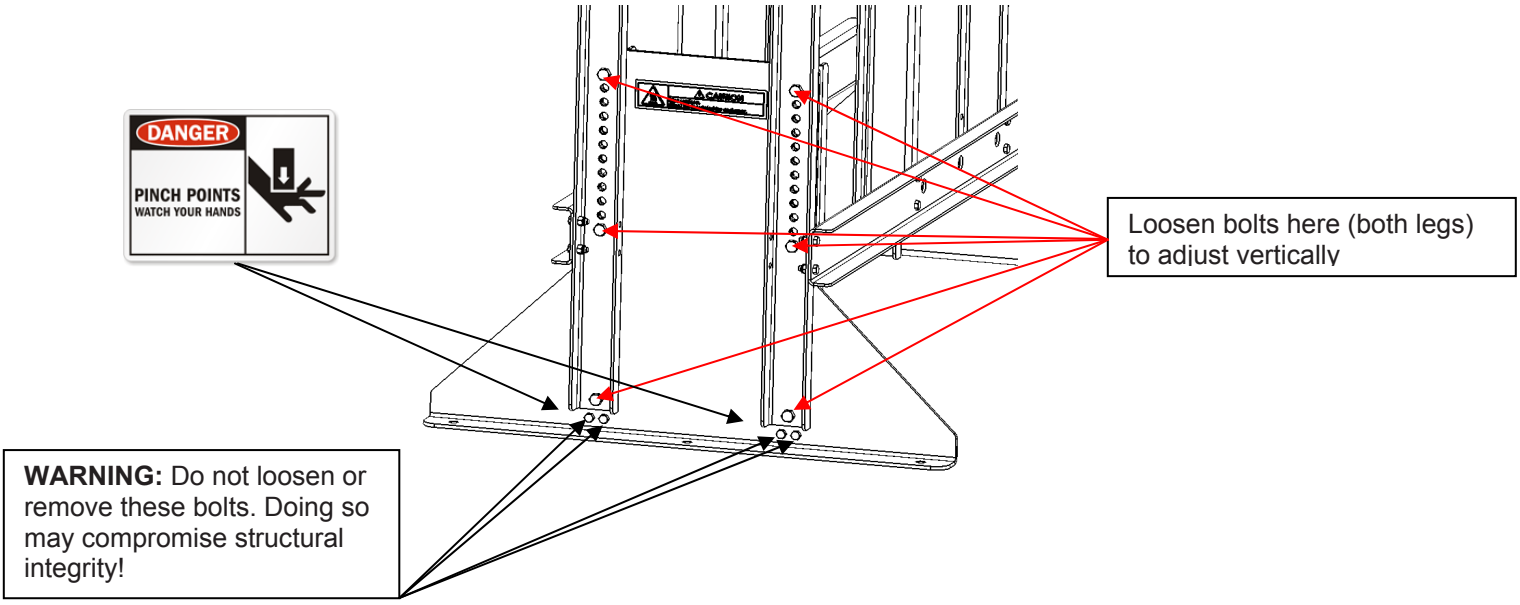


5.2.2 Vertical Adjustment

WARNING: Vertically adjusting an RCC requires removing bolts in the legs and raising or lowering the unit. Fully support assembly during adjustment to minimize potential for bodily harm.

5.2.2.1 RCC must be supported by forklift, crane, or hoist during the adjusting process.
5.2.2.2 Loosen and remove (12) bolts on the frame legs.
5.2.2.3 Bottom bolts are not removed.
5.2.2.4 Raise RCC Housing and Frame Assembly slowly to the desired height.
5.2.2.5 Replace bolts; one at top hole, one at bottom, and one in the middle (**See Figure 5.2**).

Figure 5.2: Vertical Adjustment Diagram

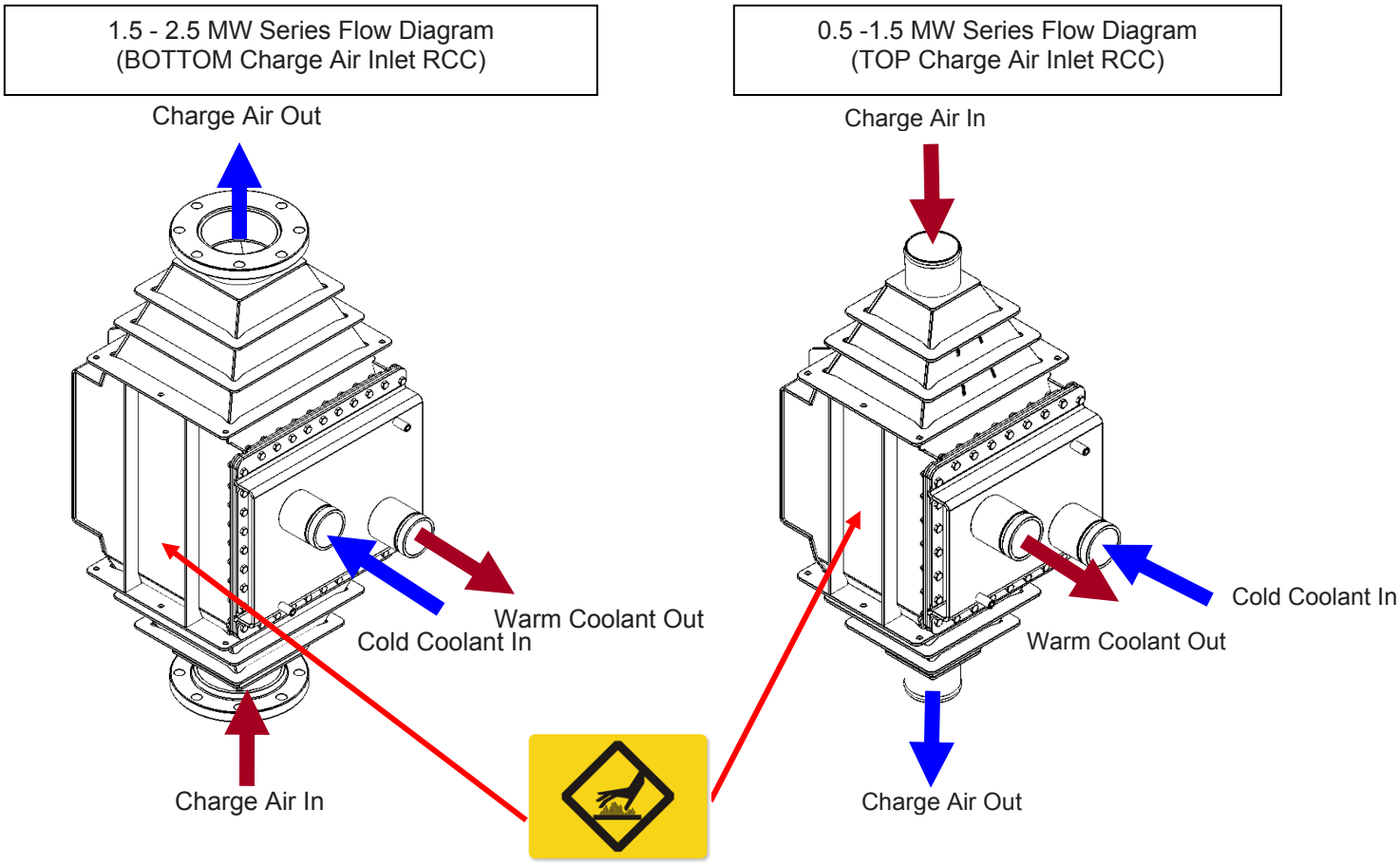


5.3 Piping General Guidelines

NOTE: The RCC charge air and coolant plumbing varies by installation site. In all cases the charge air and coolant operate in one of the two flow arrangements shown below (**See Figure 5.3**).

5.3.1 All connecting components to RCC need to be externally supported, not hung on RCC ports.
5.3.2 Use flexible connections to isolate RCC from vibration, thermal growth or shock.
5.3.3 **All piping should be flushed clean with water and dried before connecting to either radiator and/or engine.**
5.3.4 Strainers or filters are recommended in coolant circuit for initial start-up to remove any debris inside engine or piping system.
5.3.5 Auxiliary boost pump may be necessary depending upon system losses, such as pipe length, radiator elevation, fitting types and quantities, etc.
5.3.6 When testing coolant or air connections for leaks, **DO NOT EXCEED PRODUCT PRESSURE/FLOW RATINGS (Per Tables 8.1& 8.2).** Doing so may compromise integrity of the system.

Figure 5.3: Flow Diagrams for RCCs



CAUTION: SURFACES ARE HOT!

Figure 5.4: General Air and Water Plumbing Diagram for 1.5 - 2.5 MW Series (Bottom Charge Air Inlet)

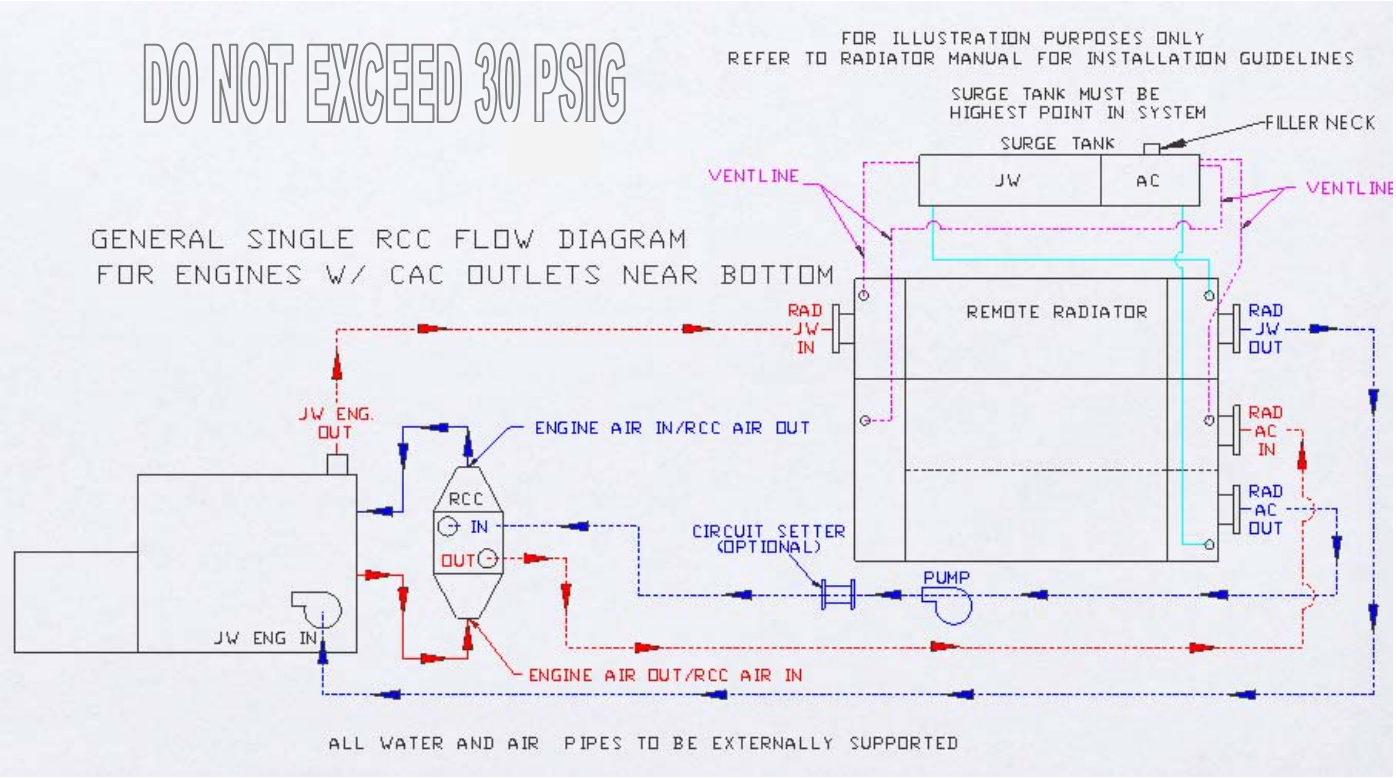
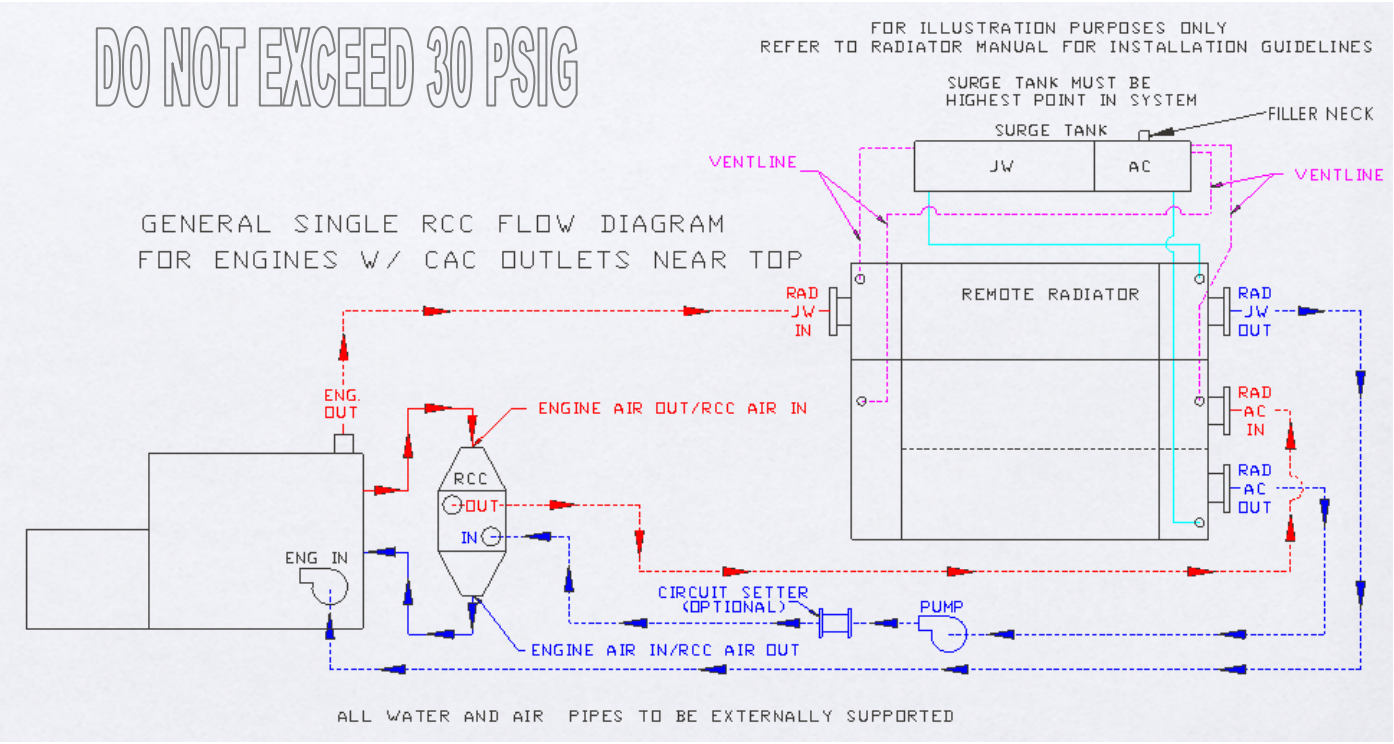


Figure 5.5: General Air and Water Plumbing Diagram for 0.5 - 1.5 MW Series (Top Charge Air Inlet)



NOTE: To prevent bodily harm, it is the responsibility of the end user to fully insulate all hot surfaces in the system.

5.4 Charge Air Cooler Pipe Kit Installation

WARNING: To prevent bodily harm, it is the responsibility of the end user to fully insulate all hot surfaces in the system.

5.4.1 In all cases, the Charge Air Cooler Pipes shall be installed FIRST.
5.4.2 Bolted connections shall be LOOSELY connected.
5.4.3 All ANSI flanges require gaskets suitable for 500°F, 50 psig air (**See Figure 3.2**).
5.4.4 Once all connections are loosely lined up, tighten bolts to specified torque rating.
5.4.5 **See Table 8.3** for torque specs on all bolts.
5.4.6 All CAC connections must have steel Containment Clamps installed to prevent hoses from blowing off (**See Figure 3.2**).
5.4.7 **DO NOT CANTILEVER ANY PLUMBING COMPONENTS ON AIR FITTINGS!**

5.5 Coolant Manifold Installation

NOTE: Coolant manifolds and remote radiators are site specific and supplied and installed by customer per site requirements.

5.5.1 Plumb coolant manifold per remote radiator and site specific requirements, ensuring proper flow requirements of RCC are followed (**See Figures 5.3, 5.4 & 5.5**).
5.5.2 Slide coolant gasket over fitting (Victaulic) on RCC Housing (**See Figure 3.2**).
5.5.3 Align coolant fittings (Victaulic) on RCC Housing with coolant fittings (Victaulic) on coolant manifold (**See Figure 3.2**).
5.5.4 Slide coolant gasket into position, centered between coolant manifold and RCC Housing's Victaulic fittings.
5.5.5 Tighten Victaulic clamps over gasket to required torque specifications (**See Table 8.3**).
5.5.6 **DO NOT CANTILEVER ANY PLUMBING COMPONENTS ON COOLANT FITTINGS!**

5.6 Connection Containment

5.6.1 Connection containment kits consist of steel bolt-on straps used to capture and reinforce the connections on the hot and cold charge air pipes. (**See Figure 3.2**).
5.6.2 Connections kits will be supplied by either IEA or the engine manufacturer.
5.6.3 For placement and mounting locations of containment kits, please refer to installations drawings per model as supplied by IEA.
5.6.4 **ALL SILICONE HOSES FOR RCCS MUST BE SECURED USING CONTAINMENT KITS SUPPLIED BY IEA OR ENGINE MANUFACTURER AS RECOMMENDED.**

5.7 Condensate Drain

NOTE: Condensation may build up in RCC during periods of engine inactivity or in applications with high relative humidity and low dew point temperature surfaces. Drain condensate at frequencies determined by site specific requirements.

5.7.1 Refer to supplied installation drawing for location of condensation drain.
5.7.2 Remove the 1/2" NPT plug from center of drain (**See Figure 5.6**).
5.7.3 Allow all condensate (if any) to drain from the tube.
5.7.4 Replace 1/2" NPT plug.
5.7.5 Tighten plug to recommended torque specs (**See Table 8.3**).
5.7.6 Repeat above steps for all Condensate Drains present.

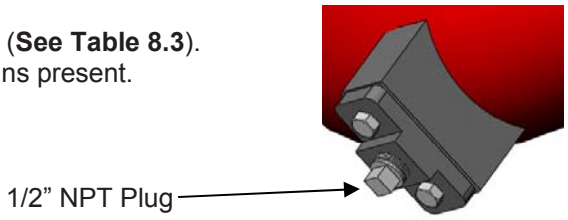


Figure 5.6: Condensate Drain

6. OPERATION

6.1 Optional Air Pressure Decay Leak Test

NOTE: This test is used to ensure customer supplied coolant manifold is leak free; therefore, not required for RCC assembly.

6.1.1 Ensure all valves in system are set correctly (open or closed) for proper flow progression.
6.1.2 Fill to 10 psig with air. **DO NOT EXCEED 30 psig**.
6.1.3 Shut off air supply.
6.1.4 Measure air pressure for 10 minutes. A zero (0) psig loss in air pressure over 10 minutes is considered a leak free system.
6.1.5 If leak(s) are present, repair as needed.
6.1.6 If leak(s) are present but cannot be found, contact IEA representative using the contact information below.
6.1.7 Relieve air from system and commence filling procedure.

6.2 System Filling

6.2.1 **NEVER FILL SYSTEM WITH UN-INHIBITED WATER! USE INHIBITED COOLANTS ONLY!** (**See Tables 8.1 & 8.2**).
6.2.2 Ensure all valves in system are set correctly (open or closed) for proper flow progression.
6.2.3 Fill system with pump off.
6.2.4 Fill through the filler neck located on the surge tank (**See Figures 5.4 & 5.5**), or pump coolant in through drain port, until the unit is full.
6.2.5 Open all vents in Remote Radiator until coolant comes out; then close (**See Figures 5.4 & 5.5**).
6.2.6 **WARNING: DO NOT EXCEED 30 psig in next step!**
6.2.7 Turn on pump & circulate coolant until system is deareated (verified via site-glass) and the coolant level stops dropping.
6.2.8 Refill system as necessary.
6.2.9 **See Figure 5.4 or 5.5** for plumbing diagram.

6.3 System Venting

6.3.1 Ensure all valves in system are set correctly (open or closed) for proper flow progression.
6.3.2 Ensure that all vent lines are directed “upward” and contain no loops or dips.
6.3.3 All vent lines should terminate in surge tank (**See Figures 5.4 & 5.5**).
6.3.4 **CAUTION**: **WHEN VENTING COOLANT SYSTEM – HIGH PRESSURE AIR AND/OR HIGH TEMPERATURE COOLANT CAN CAUSE SERIOUS INJURY!**

6.4 Final Unit Inspection

6.4.1 Read and understand this manual before operating RCC.
6.4.2 Visually inspect RCC assembly. Check all decals, hose connections and other hardware.
6.4.3 If any parts are broken or missing, repair or replace them before operating the RCC.
6.4.4 Ensure all Containment Kit clamps are installed and secure (**See Section 5.6**).
6.4.5 Ensure all valves in system are set correctly (open or closed) for proper flow progression.
6.4.6 Remove condensation drain and drain any condensate present; replace drain. (**See Section 5.7**)
6.4.7 Ensure that qualified personnel have performed all recommended maintenance and made all adjustments to the RCC before operation.
6.4.8 Ensure all required air/coolant pressure gauges are present and functioning.
6.4.9 Wear approved safety attire, when operating the RCC system (**See Section 1.4**).

6.5 Initial Run

6.5.1 Activate engine and allow it to come up to standard operating temperature under no load (idle).
6.5.2 Check coolant, charge air connections and fittings for any leaks. Repair as necessary with engine turned off.
6.5.3 If system is leak free at engine standard operating temperature, commence load banking as per manufacturer/site requirements.

7. MAINTENANCE

WARNING: NEVER PERFORM ANY MAINTENANCE PROCEDURES DURING ENGINE OPERATION!

NOTE: The below list of maintenance check-points are based on standard installation applications. Further maintenance may be required for site-specific installations where standard arrangements cannot be achieved. Always consult IEA during installation for these cases, **prior to coolant line filling and start up**.

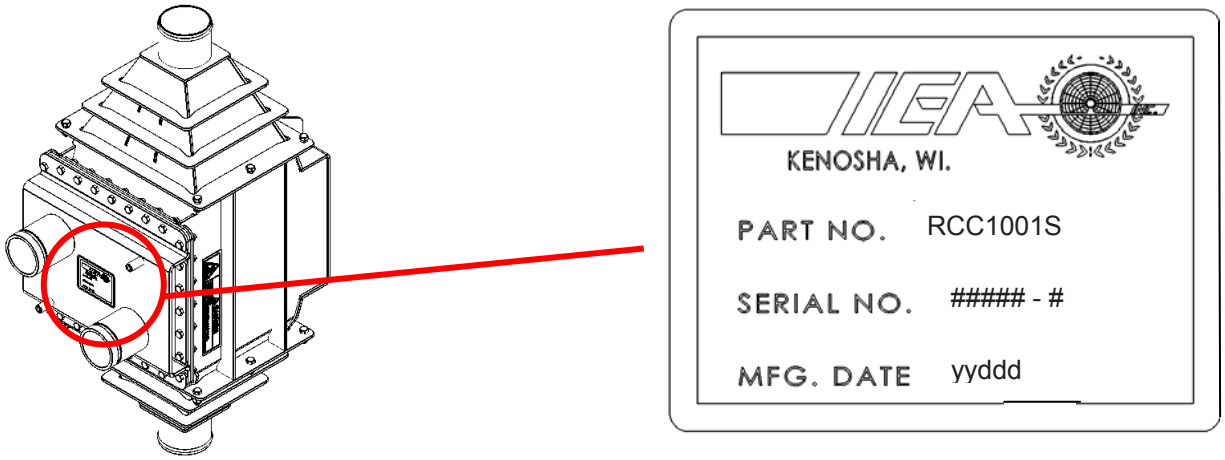
Inspect RCC to ensure the following are true:

7.1 The unit maintains a plumb and level mounting orientation.
7.2 There is no uncommon or excessive noise being produced by the RCC.
7.3 All bolts on RCC Housing and Frame Assembly are tightened to the proper specifications (**See Table 8.3**).
7.4 Ensure the unit has not undergone any unusual shifts in position.
7.5 Visually inspect unit for any coolant or air leaks.
7.6 Ensure all drains are in-place and leak free.
7.7 Check all fluid levels for proper fill.
7.8 **NEVER REFILL SYSTEM WITH UN-INHIBITED WATER! USE INHIBITED COOLANTS ONLY!**
7.9 Inspect and replace as necessary any air filters used upstream of RCC.
7.10 Periodically test coolant to assure it is free of sediment, corrosive products, or biological contaminants.
7.11 If automatic air vents are not used – periodically vent any entrapped air in System.
7.12 **CAUTION: WHEN VENTING COOLANT SYSTEM – HIGH PRESSURE AIR AND/OR HIGH TEMPERATURE COOLANT CAN CAUSE SERIOUS INJURY!**
7.13 For winter storage, all coolant shall be removed and system dried to avoid freeze damage.
7.14 Open condensate drain periodically to relieve any condensate that may have accumulated. Frequency is dependant on site environment and unit design and should be done in regular intervals at user's discretion. Refer to supplied installation drawing for location of condensation drain.

7.15 **Troubleshooting:** Always contact IEA whenever system troubles arise. Before calling the assistance hotline, have the following information prepared:

7.15.1 RCC Part Number (**See Figure 7.1**).
7.15.2 RCC Serial Number (**See Figure 7.1**).
7.15.3 RCC MFG Date (**See Figure 7.1**).
7.15.4 Number of RCCs installed at site.
7.15.5 Engine Manufacturer and Engine Number.
7.15.6 Description of site error or failure.

Figure 7.1: RCC ID Tag Location and Detail



8. APPENDIX I

8.1 Product Specifications and Limits

RCC 1.5-2.5 MW Series			
	Min	Max	Units
Medium (No Water)	50%/50% Vol Ethylene Glycol / Water		
Flow Rate	50	150	gpm
Inlet Temp	-25 °F	220	°F
Inlet Pressure	NA	30	psig
Pressure Drop	1	5	psid
Coolant Volume	4.5		gal
Heat Transfer Rate	NA	~ 21,000 Btu/min	Btu/min
Entering Temp Difference	275	525	°F
Medium	Charge Air		
Flow Rate	200	250	lb/min
Inlet Temp	250	500	°F
Inlet Pressure	NA	45	psig
Pressure Drop	NA	1	psid

Table 8.1: RCC 1.5 – 2.5 MW Product Limits

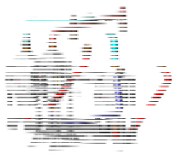
RCC 0.5-1.5 MW Series			
	Min	Max	Units
Medium (No Water)	50%/50% Vol Ethylene Glycol / Water		
Flow Rate	25	125	gpm
Inlet Temp	-25 °F	220	°F
Inlet Pressure	NA	30	psig
Pressure Drop	1	5	psid
Coolant Volume	3		gal
Heat Transfer Rate	NA	~ 10,000 Btu/min	Btu/min
Entering Temp Difference	275	525	°F
Medium	Charge Air		
Flow Rate	75	125	lb/min
Inlet Temp	250	500	°F
Inlet Pressure	NA	45	psig
Pressure Drop	NA	1	psid

Table 8.2: RCC 0.5 – 1.5 MW Product Limits

BOLT TORQUE SPECS		
Bolt size	Torque (ft-lbs)	Location In Assembly
1/2" Bolts (Grade 8)	35	RCC Housing & Frame assembly
5/8" Bolts (Grade 8)	150	Frame Assembly
3/4" Bolts (Grade 8)	200	CAC Pipe Kit
1/2" NPT	25	Condensate Drain

Table 8.3: Bolt Torque Specs

8.2 Product Offering

Engine	RCC UNIT #	FRAME #	RCC & FRAME #	PIPE KIT #	RCC, FA, PK
	RCC	FRAME ASSEMBLY	MOUNTED RCC	CAC PIPE KIT	RCC - FULL ASSEMBLY
500 KW					
	RCC	FRAME ASSEMBLY	MOUNTED RCC	CAC PIPE KIT	RCC - FULL ASSEMBLY
500 KW					
	RCC	FRAME ASSEMBLY	MOUNTED RCC	CAC PIPE KIT	RCC - FULL ASSEMBLY
550 KW					
	RCC	FRAME ASSEMBLY	MOUNTED RCC	CAC PIPE KIT	RCC - FULL ASSEMBLY
600 KW					
	RCC (2)-UNITS	FRAME ASSEMBLY	MOUNTED RCC (2)	CAC PIPE KIT	RCC - FULL ASSEMBLY
800-1000 KW					
	RCC (2)-UNITS	FRAME ASSEMBLY	MOUNTED RCC (2)	CAC PIPE KIT	RCC - FULL ASSEMBLY
1500 KW					
	RCC (2)-UNITS	FRAME ASSEMBLY	MOUNTED RCC (2)	CAC PIPE KIT	RCC - FULL ASSEMBLY
2000 - 2500 KW					

NOTE: To prevent bodily harm, it is the responsibility of the end user to fully insulate all hot surfaces in the system.