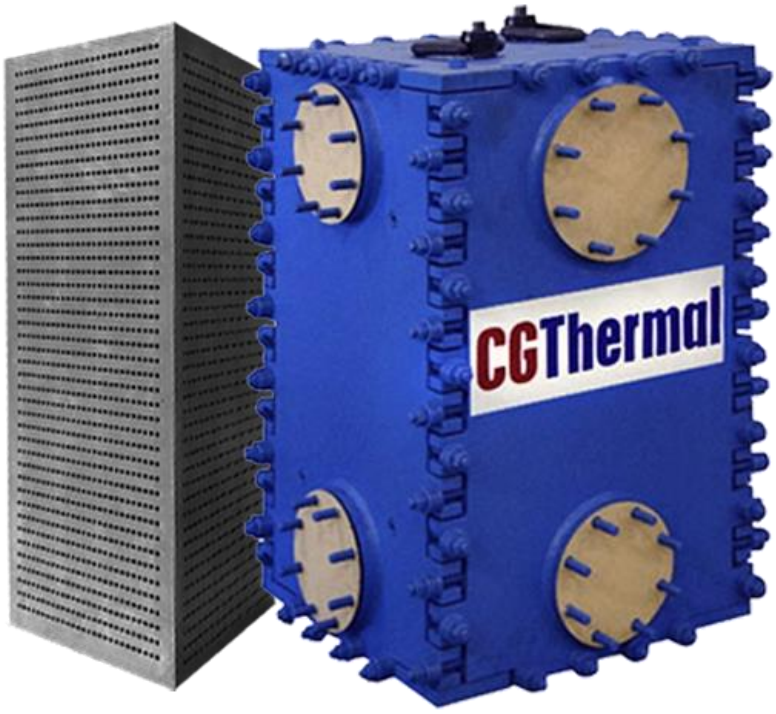
CGThermal
Process Technology Solutions
for Harsh and Corrosive Process Streams

MADE WITH PRIDE IN THE USA
100% AMERICAN OWNED & OPERATED

Impervite Graphite Cubic Heat Exchanger

Installation, Operation, and Maintenance Instructions



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The information, recommendations, and opinions set forth herein are offered solely for your consideration, inquiry, and verification and are not, in part or total, to be construed as constituting a warranty or representation for which we assume legal responsibility. CG Thermal, LLC disclaims all warranties as to the accuracy of data supplied for any individual installation. Nothing contained herein is to be interpreted as authorization to practice a patented invention without a license

Proper safety precautions as detailed throughout this manual and as recommended by applicable codes, guidelines, and design societies should be exercised in the operation of all heat transfer equipment to prevent equipment damage or personal injury in the event of operation error or mechanical failure

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SECTION I. INTRODUCTION

1-1 SCOPE

This manual covers installation, operations, and maintenance instructions for the Impervite Cubic Heat Exchangers, manufactured by CG Thermal.

1-2 DESCRIPTION AND APPLICATION

The CG THERMAL Impervite Cubic heat exchangers are designed to handle corrosive liquids and gases. Impervite has the features of optimum thermal conductivity with extreme resistance to corrosion and thermal shock.

The Impervite Cubic heat exchangers are provided with a single cubic graphite block held in compression between six steel heads. The block has two circuits of holes drilled perpendicular to each other, serving as process and service circuits. The service heads are generally made of fabricated steel. The process heads are lined with Impervite for corrosion resistance. When designed as an interchanger, all four headers are Impervite-lined.

Figure **1-1.** Typical packaging and lifting of the Cubic Heat Exchanger.

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INSPECTION UPON RECEIPT

Heat exchangers could be affected by handling during transit. For this reason, warranty provisions require that inspection of heat exchangers be completed upon receipt.

Use the following instructions for inspections UPON RECEIPT:

1. Immediately upon receipt, and before removing the heat exchanger from the carrier vehicle. Examine the skid and shipping covers for damage in transit.

2. Remove covers and visually inspect all components for damage.

3. Re-torque may be necessary due to the gasket "set" during transportation**. Refer to the torque values and torquing sequence provided on the red tags attached to the unit.**

4. Perform a service-side hydrostatic test. DO NOT exceed the design pressure shown on the assembly drawing.

5. Please complete and sign the attached inspection report and return a copy to CG Thermal within one week of receipt to validate the equipment warranty.

6. ***If the above testing and documentation are not completed, any damage found later will be the responsibility of the customer.*** The carrier is responsible for equipment losses and damage during shipment. If any components are missing or damaged or if leaks still occur after the service side hydrostatic test, notify the carrier immediately and file an appropriate claim. Notify CG Thermal LLC immediately if any questions arise or if the heat exchanger is to be rejected and returned.

When moving the heat exchanger, note lifting points are located on clamp plates. Do not use holes on the heads for lifting, as that could lead to damage of the unit.

If the heat exchanger is not immediately installed, drain the test water completely to prevent freeze damage. Store the unit in a covered area to protect the components from moisture.

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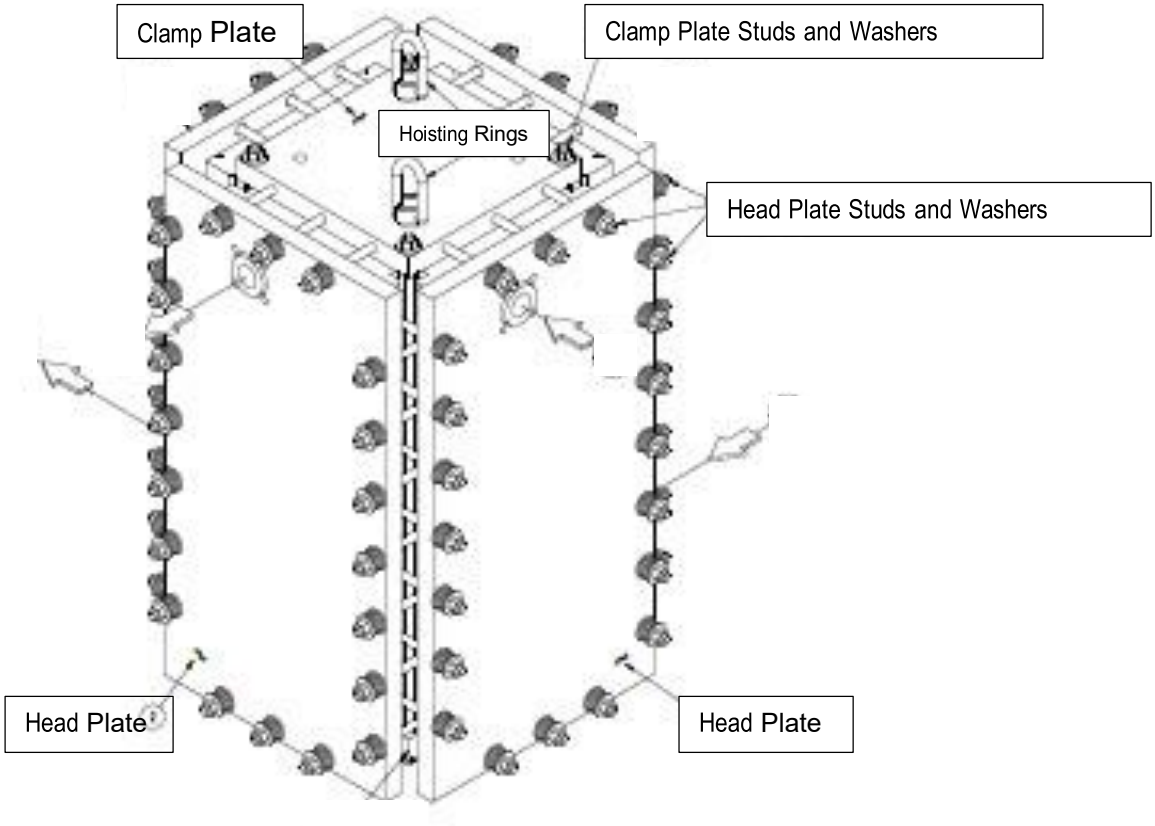

Figure 1-2. Component Features

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SECTION II. INSTALLATION

2-1 PIPING REQUIREMENTS

Piping connections can be made using normal precautions for good practice in flange alignment. Steam lines should be properly trapped and provisions made to drain all water legs which might develop in the supply line on shutdown. If automatic controls are used on the steam line, use slow opening valves to prevent water hammer. Automatic control valves, when closed or almost closed, can allow steam to enter the heat exchanger without providing enough pressure to discharge the condensate. Therefore, condensate lines should be arranged so there is no back pressure after the trap, and a vacuum breaker should be provided on the shell. This will permit condensate to drain by gravity.

2-2 PROCESS PIPING REQUIREMENTS

Piping to the Impervite process nozzles should be studied and planned carefully to prevent any stresses from being transmitted to the Impervite parts. Flexible couplings, installed as close to the exchanger as possible, are recommended to isolate the unit from vibration, misalignment, thermal expansion of the piping, or other loads, which can impose stress on the internal Impervite parts.

Observe the stated torque values on your assembly drawing for the Impervite nozzles. Over-torquing can put undue loading on the internal Impervite, which may cause it to crack.

Use gaskets that are easy to seal with a maximum Y-value of 1300 psig and a minimum M-value of 2.5. Woven PTFE tape gaskets (such as John Crane 1050G or equivalent) are recommended. The gasket should cover the graphite face.

Impervite Nozzles		
Nom. Diameter	***ID (in.)***	***OD (in.)***
3/4"	0.75	1.75
1"	1	2.125
1- 1/2"	1.5	2.875
2"	2	3.5
3"	3	4.75
4"	4	6.25
6"	6	8.125
8"	8	10.375
10"	10	12.625
12"	12	15.375
14"	14	17

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2-3 PRESSURE RELIEF DEVICES/THERMOWELLS

If the heat exchanger is to be operated under pressure,ite snrecommended to installf a pressure relief devicd. Refer to ASME Code Section VIII, Division I, for recommendations on these devices. Install them in process piping lines to minimize the number of openings in the heat exchanger.

For added convenience, thermowells can be installed on the inlet and outlet sides to always permit rapid visual checks of exchanger operation. Additionally, the installation of a bypass valve system on the heat exchanger piping will allow the disassembly of the heat exchanger itself without shutting down the line.

2-4 DISC SPRINGS

The disc springs allow for the normal growth differences between the plates and Impervite while maintaining proper gasket compression. When put into service, the gaskets may tend to cold flow slightly, and re-torquing may be required.

Do NOT exceed the torque values shown on the assembly drawing. Replace damaged or defective disc springs. Applying torque beyond the recommended maximum will increase the bolt load and reduce the expansion capability of the unit, potentially resulting in damage to the heat exchanger.

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SECTION III. OPERATION

3-1 OPERATING PRECAUTIONS

Do NOT operate the heat exchanger at pressure or temperature conditions exceeding those specified on its nameplate and specification sheet. Exceeding the values could result in a catastrophic mechanical failure and serious bodily injury.

Do NOT blow out the heat exchanger with air if the material normally handled is flammable. Spreading these materials could result in a fire and serious bodily harm.

Do NOT remove the clamp plates until all pressure is relieved and liquids have been drained. Opening the heat exchanger while under pressure can result in the explosive movement of the clamp plates or internal parts, potentially causing bodily harm.

Although Impervite itself is immune to thermal shock, do NOT thermal shock the heat exchanger with a hot liquid or vapor when it is empty or cold, nor with a cold fluid when the heat exchanger is hot. Gradually bring the heat exchanger up to operating conditions as outlined in paragraph 3-2, Start-up. Using the recommended start-up procedures will reduce the possibility of damage due to mechanical stresses resulting from rapid temperature changes.

3-2 START-UP

To start the heat exchanger, run the cold medium through first, then follow with the hot medium. Open valves slowly, flooding the unit and venting all air, before allowing full flow. The steam trap bypass valve should be open when starting up a steam-heated heat exchanger. This valve can be closed when a steady flow of steam has been attained. Also, on steam-heated heat exchangers, it is important that the steam be shut off promptly whenever the flow of process fluid is stopped or interrupted. If the steam remains on, the stagnant process fluid will boil, creating local pressure shocks that can crack the Impervite components.

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SECTION IV. HEAT EXCHANGER MAINTENANCE

4-1 INSPECTION AND CLEANING

Maintain a schedule of periodic inspections to check gasket joints and to determine the need for cleaning the exchanger. Chemical cleaning to remove scale buildup is the fastest and most convenient cleaning method. Avoid highly oxidizing chemicals, as they may attack the Impervite components. Caustic solutions should be used only on exchangers with special cements and impregnating resins resistant to alkaline solutions. (If you have questions about the proper cleaning solution for your heat exchanger, contact CG Thermal, LLC with the serial number of your exchanger.)

4-2 SERVICE and REPAIR

If a gasket leak is detected, transfer is occurring, or chemical methods for removing scale buildup are not satisfactory, please contact CG Thermal. Field or factory service is recommended when disassembly of the cubic unit is required.

For replacement parts, field service, or exchanger rebuilding, call:

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