



**GRAHAM**  
ENGINEERING ANSWERS

## HELIFLOW VENT CONDENSERS

- For • *STORAGE TANKS*
- *DISTILLATION COLUMNS*
  - *PROCESS REACTORS/REFLUXING*
  - *VAPOR RECOVERY SYSTEMS*

**Minimize Air Contaminants**

**Recover Valuable Solvents**

**Cryogenic, Water or  
Brine Cooled**

**Counter Flow Maximizes  
Vapor Removal**

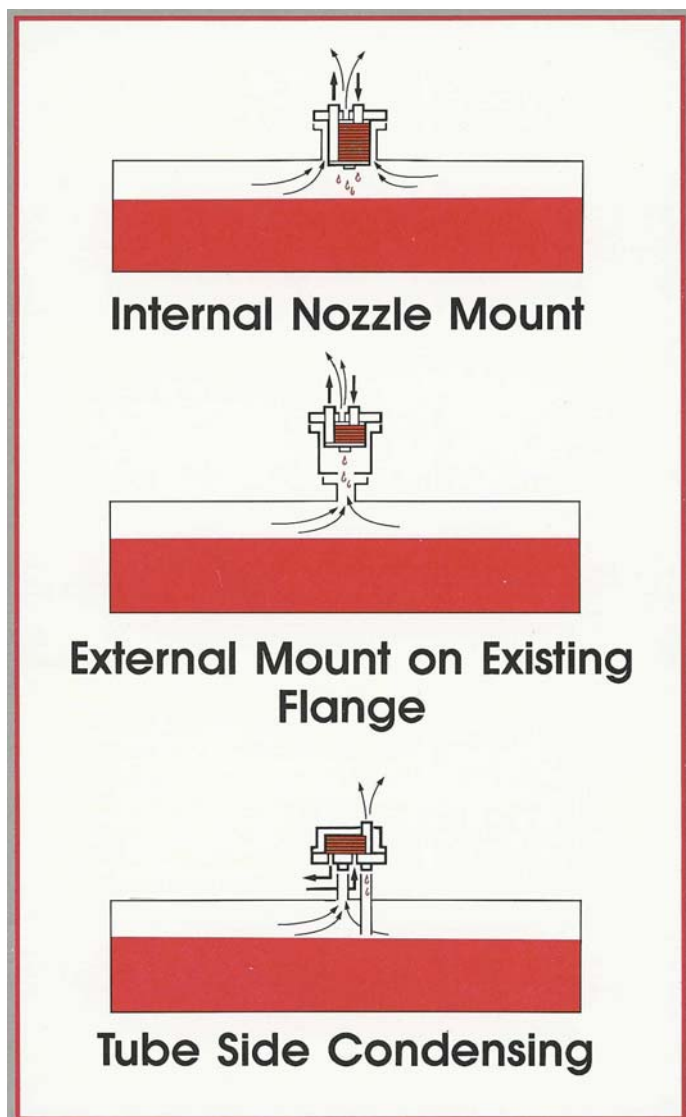
**Proven Design with Low  
Pressure Loss**

**Compact Design for  
Easy Installation**

**Accommodates Mounting  
of Conservation Vents  
and Flame Arresters**

**Wide Range of Metallurgies**

**Eighty Standard Sizes**



# GRAHAM HELIFLOW<sup>®</sup>

## Vent Condenser Design Advantages

The unique Heliflow<sup>®</sup> counter flow heat exchanger, long noted for its spiral counter flow design, has now been adapted for storage tank vent condensing applications.

To prevent pressure build up or collapse under vacuum, liquid storage tanks are vented to the atmosphere. Loss of vapor from atmospheric storage tanks can, under some circumstances, be surprisingly large and costly.

As storage tanks are warmed by the sun during the day, liquid is vaporized and is vented to the atmosphere.

At night, vapor and liquid volume decrease and air is drawn in, only to be re-expelled together with its saturation vapor component during the next temperature rise.

A similar situation occurs when the tank is filled or drained, with vapor exiting during filling and air entering during drainage.

The loss of vapor during these episodes may or may not be a major cost factor, but increasing government environmental regulations require that even the escape of relatively small vapor quantities be limited.

Graham Corporation has developed several versions of its world famous Heliflow spiral counter flow heat exchanger, which can be readily installed in or on existing, as well as new, storage tanks.

These compact counter flow devices assure that the vented gases are stripped of saturation vapors by optimizing cooling as exiting gases are sub cooled by the "coldest" entering cooling medium.

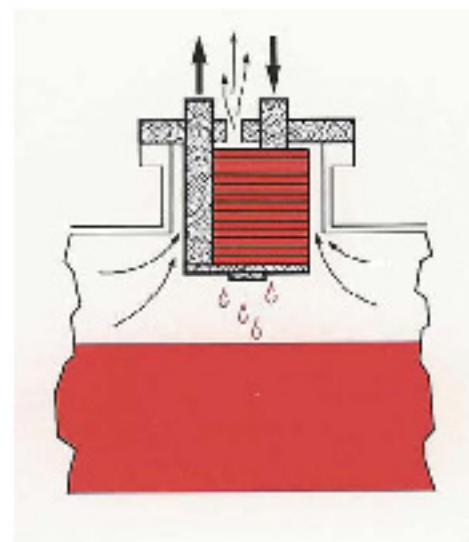
The Heliflow's unique coil design allows it to operate under extremes of temperature and pressure. This ability to absorb thermal stresses proves ideal in vent condenser applications where cooling mediums of chilled thermal fluids, refrigerants and liquified gases can be utilized by sub zero cooling of process vent gases.

The unique Heliflow design forces the vapor around the long spiral path, counter flow to the coolant. Designs are available for vapor flow within the tubes as well as on the shell side. In all cases, the same spiral counter flow arrangement is utilized.

Even at low velocity, the vapors are caused to constantly change direction as they impact the spiral tube barrier, yet pressure drop is minimized because both tube and shell side are fed in parallel.

Unlike shell and tube exchangers, the Heliflow design has the thermal characteristics of a double pipe exchanger, yet provides equipment compactness. Since the flow path continuously turns, the Heliflow has the added advantage of the vapor not slipping along the tube but must constantly change direction and impinge on the tube surface, thus assuring contact and condensation, wringing moisture from exiting gases as they are cooled by the cold entering cooling medium.

### VCIN Internal Nozzle Mount



#### VCIN Internal Nozzle Mount

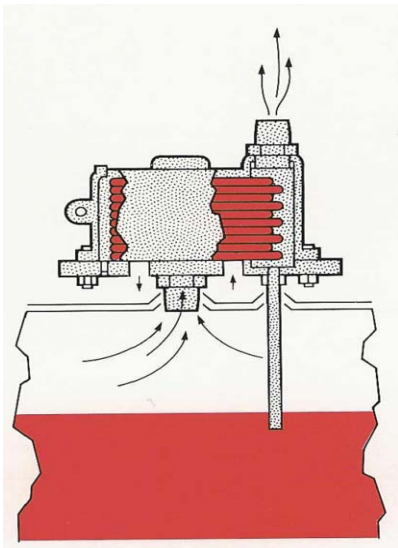
This model is supplied with the bundle mounted on the base plate for installation directly inside the nozzle of a storage tank or process vessel. A baffle plate is positioned on the bottom of the bundle parallel to the base plate. This forms a flow channel that directs the vapor into the bundle at the location where the cooling media exists. Vapors are then directed through the spiral path toward the cooling media inlet connection. This insures a fully counter current flow for optimal cooling and subsequent condensation.

Condensed vapors collect on the baffle plate and drip back into the process vessel or storage tank. This design offers the lowest profile and avoids the cost of a casing.



# Graham Heliflow<sup>®</sup> Vent Condensers available in a wide range of styles and areas 1 ft.<sup>2</sup> to 650 ft.<sup>2</sup>

VCT  
Tube Side  
Condensing



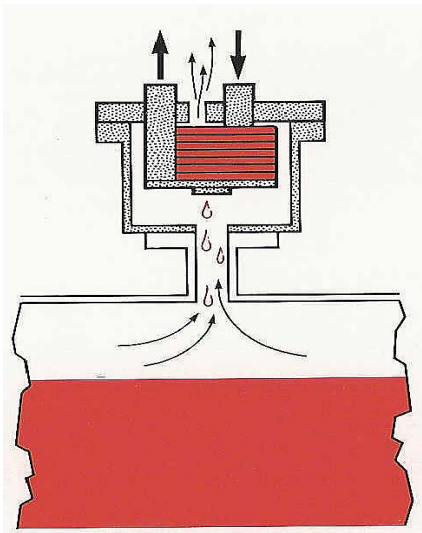
## VCT Tube Side Condensing

When corrosive vapors require special metallurgy, the vapors can be condensed tube side, thus limiting special materials to the bundle only.

Vapors entering the bundle are contained within the manifold and parallel tubes. Entrance is adjacent to shell side coolant outlet. The vapors must follow the spiral tube path in counter flow to coolant, and exit adjacent to the shell side cooling inlet.

Condensed liquid drains down the exhaust manifold into the storage tank, or via piping to external receiver.

VCON  
External Mount on  
Existing Flange

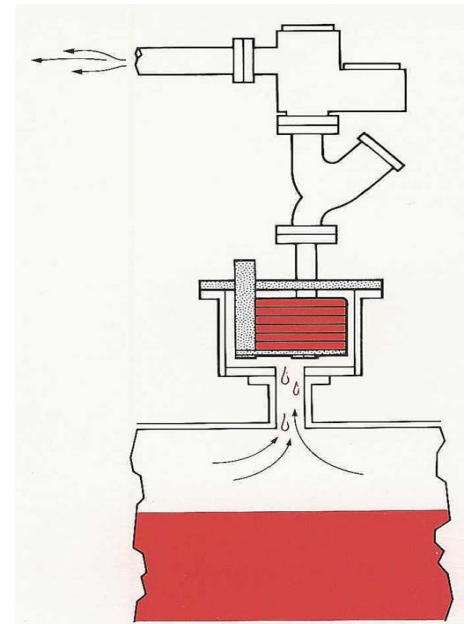


## VCON External Mount on Existing Flange

If the existing flange on the storage tank is too small to accommodate the VCIN internal nozzle mount, this version can be utilized.

Vapors rising from the tank enter the bottom of the extended Heliflow casing. The bundle and base plate are identical to the VCIN design. Vapor flow is forced to follow the same horizontal spiral counter flow path, exiting the base plate adjacent to the coolant inlet manifold. Condensate drips off the bottom baffle and back into the storage tank through the flanged nozzle, or via drain piping to external receiver.

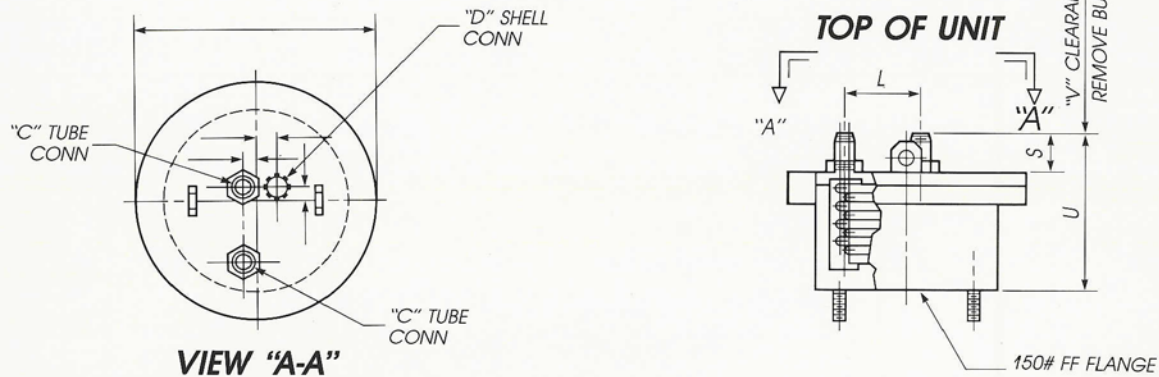
VCON/VCIN  
with  
FLAME ARRESTER  
and/or  
CONSERVATION VENT



## Direct Mounting

The compact design and unique orientation of the Heliflow VCON and VCN styles accommodates the direct mounting of a flame arrester and/or conservation vent on the vent condenser outlet connection. This feature eliminates extensive interconnecting piping and supports making installation simple and economical.

# HELIFLOW VENT CONDENSER STYLE "VCON"



# FEMALE THREADS

SIZE					ALL DIMENSIONS ARE IN INCHES									
					A	C	D*	G	H	L	S	U	V	W
4-10	3-10				12 1/8	1/2	1/2	5/8	7/8	3 1/16	1 1/2	4 7/8	4	1
8-10					12 1/8	1/2	1/2	5/8	7/8	3 1/16	1 1/2	5 3/8	5	1
4-12					14 5/8	1 1/4	1	1	1 1/16	4 1/4	2 1/2	6 5/8	5	1
8-12	6-12	12-12			14 5/8	1 1/4	1	1	1 1/16	4 1/4	2 1/2	7 5/8	5	1
9-14S	12-14S	18-14S			16 7/8	1 1/4	1 1/2	15/16	1 5/16	5 3/8	2 11/16	9 13/16	8	1
15-14L	12-14L	20-14L	30-14L		16 7/8	1 1/4	1 1/2	15/16	1 5/16	5 3/8	2 11/16	12 13/16	11	1
9-16S	12-16S	18-16S			20	2	2	1 7/16	1 9/16	6 7/8	2 13/16	10 3/16	8	1 1/2
15-16L	10-16L	12-16L	20-16L	30-16L	20	2	2	1 7/16	1 9/16	6 7/8	2 13/16	13 3/16	11	1 1/2
30-16LL					20	2	2	1 7/16	1 9/16	6 7/8	2 13/16	20 11/16	19	1 1/2
15-18S	10-18S	12-18S	20-18S		22 3/8	2 1/2	2 1/2	1 13/16	1 13/16	8	3 3/8	14 1/4	12	1 9/16
30-18L	24-18L	20-18L			22 3/8	2 1/2	2 1/2	1 13/16	1 13/16	8	3 3/8	21 3/4	19	1 9/16
12-20S	10-20S	15-20S	20-20S		25	2 1/2	2 1/2	1 13/16	1 13/16	9	3 1/4	14 3/8	12	1 1/2
30-20L	20-20L	24-20L			25	2 1/2	2 1/2	1 13/16	1 13/16	9	3 1/4	21 7/8	19	1 1/2
12-22S	10-22S	15-22S	20-22S		26 7/8	2 1/2	2 1/2	2 1/8	2	10 3/8	3 3/16	14 1/2	12	1 7/8
24-22L	20-22L	30-22L			26 7/8	2 1/2	2 1/2	2 1/8	2	10 3/8	3 3/16	22	19	1 7/8
12-24S	10-24S	15-24S	20-24S		30 1/8	2 1/2	2 1/2	2 1/8	2 1/8	12	2 15/16	14 3/4	12	2 1/4
24-24L	20-24L	30-24L			30 1/8	2 1/2	2 1/2	2 1/8	2 1/8	12	2 15/16	22 1/4	19	2 1/4
12-26S	10-26S	15-26S			31 7/8	2 1/2	2 1/2	2 1/8	2 1/8	13	2 13/16	14 7/8	12	2 1/4
24-26L	20-26L	30-26L			31 7/8	2 1/2	2 1/2	2 1/8	2 1/8	13	2 13/16	22 3/8	19	2 1/4
12-28S	10-28S	15-28S			36 7/8	3	3	2 5/8	2 5/8	14 1/2	3 3/8	15 7/8	12	2
24-28L	20-28L	30-28L			36 7/8	3	3	2 5/8	2 5/8	14 1/2	3 3/8	23 3/8	19	2

NOTE: ALL DIMENSIONS ARE SUBJECT TO CHANGE DEPENDING ON CUSTOMER REQUIREMENTS AND DESIGN CONDITIONS.

Graham provides vacuum and heat transfer equipment to the chemical, petrochemical, pharmaceutical, power and process industries – Our products include:

- Heliflow Heat Exchangers
- Desuperheaters
- Steam Jet Ejectors
- Plate Heat Exchangers
- Steam Surface Condensers
- Atmospheric Relief Valves
- Steam Vacuum Refrigeration Systems
- Liquid Ring Vacuum Pumps
- Micro Mix II Water Heaters



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