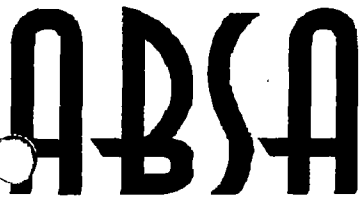


9



## Alberta Boilers Safety Association

#200, 4208 - 97 Street

Edmonton, Alberta, Canada T6E 5Z9

Tel: (780) 437-9100 / Fax: (780) 437-7787

Attention: Wayne Zahayko  
WATERFLOOD SERVICE & SALES LTD  
BOX 1490  
ESTEVAN, SK S4A 2L7

Re: Design registration

The design submission, tracking number 2002-02917, originally received on May 03, 2002 was surveyed and accepted for registration as follows:

CRN : A4765.32

Accepted on : June 07, 2002

Drawing No. : SCRU-24-68-2ST Rev 1

Reg Type: New Design

Description	Design Pressure	Design Temperature	MDMT
Internal Pressure	1034 kPa	177°C	-29°C

An acceptance letter and a copy of the stamped drawing will be sent to you.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 332 or fax (780) 437-8797 or e-mail [Desai@albertaboilers.com](mailto:Desai@albertaboilers.com).

Sincerely,

DESAI, B.C., P. Eng.  
Design Survey Engineer

**Alberta Boilers Safety Association**

#200, 4208 - 97 Street

Edmonton, Alberta, Canada T6E 5Z9

Tel: (780) 437-9100 / Fax: (780) 437-7787

June 07, 2002

**Attention:** Wayne Zahayko  
WATERFLOOD SERVICE & SALES LTD  
BOX 1490  
ESTEVAN, SK S4A 2L7

Re: Design registration

The design submission, tracking number 2002-02919, originally received on May 03, 2002 was surveyed and accepted for registration as follows:

CRN : A4764.32

Accepted on : June 07, 2002

Drawing No. : DD30-46-1-2 Rev 1

Reg Type: New Design

Description	Design Pressure	Design Temperature	MDMT
Internal Pressure	1034 kPa	177°C	-29°C

An acceptance letter and a copy of the stamped drawing will be sent to you.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 332 or fax (780) 437-8797 or e-mail [Desai@albertaboilers.com](mailto:Desai@albertaboilers.com).

Sincerely,

A handwritten signature in black ink that reads 'Desai B.C.' with a stylized flourish underneath.

DESAI, B.C., P. Eng.  
Design Survey Engineer

**Alberta Boilers Safety Association**

#200, 4208 - 97 Street

Edmonton, Alberta, Canada T6E 5Z9

Tel: (780) 437-9100 / Fax: (780) 437-7787

June 07, 2002

**Attention:** Wayne Zahayko

WATERFLOOD SERVICE &amp; SALES LTD

BOX 1490

ESTEVAN, SK S4A 2L7

Re: Design registration

The design submission, tracking number 2002-02918, originally received on May 03, 2002 was surveyed and accepted for registration as follows:

**CRN :** A4763.32**Accepted on :** June 07, 2002**Drawing No. :** DD24-46-1-2 Rev 1**Reg Type:** New Design

Description	Design Pressure	Design Temperature	MDMT
Internal Pressure	1034 kPa	177 <sup>o</sup> C	-29 <sup>o</sup> C

An acceptance letter and a copy of the stamped drawing will be sent to you.

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

If you have any question don't hesitate to contact me by phone at (780) 433-0281 ext 332 or fax (780) 437-8797 or e-mail Desai@albertaboilers.com.

Sincerely,

A handwritten signature in black ink, reading "Desai B.C.", is written over a horizontal line.

DESAI, B.C., P. Eng.  
Design Survey Engineer



## FLOW CONTROL

ATTN  
JADE  
CABLE

J.M. Huber Corporation  
Flow Control Division

9830 - 45th Ave.  
Edmonton, Alberta  
Canada T6E 5C5  
403 437-6316  
Fax 403 435-3074

TS & M Supply  
314 Kensington Avenue  
Estevan, Saskatchewan  
S4A 2A2

Attention: Ken

The CRN number for the six 6" closures on your PO E40915 (our Invoice 065311, dated 11/23/95) is 03052.2134. Still valid

A handwritten signature in black ink, appearing to read "Michael Smith".  
Michael Smith, P.Eng.  
Plant Engineer



## **YALE® FIGURE 500 & 500R CLOSURE INSTALLATION INSTRUCTIONS**

### **IMPORTANT INFORMATION**

#### **Note To Supervisor:**

**If possible, weld all outlets, saddles, accessory items, etc. to the vessel before attaching the closure hub. Performing secondary welds after the closure hub is attached may cause warpage to the sealing surfaces of the closure.**

**Closure Operation and Maintenance Instructions** are available under separate cover, and are included with each closure shipment. For a copy of these instructions, please contact our **Customer Service Department** at one of the following locations.

#### **IN THE U.S.**

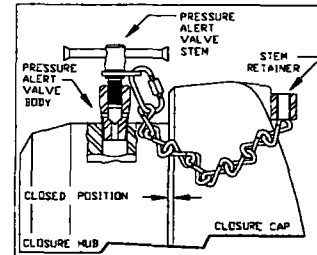
**1-800-654-5603 or (281) 315-2222**

#### **IN CANADA**

**1-800-661-5659 or (780) 437-6318**

## SECTION ONE: Disassembly of Closure Prior to Installation

**Note:** If the closure is equipped with a Pressure Alert Valve (PAV), remove the PAV stem from the PAV body and screw the stem into the retainer on the cap. (Figure No. 1)



**Figure No. 1**

### A. Disassembly of Horizontal Hinge Closure (Refer to Figure No. 2, 3, 6 & 7)

1. On closures not equipped with a Closure Actuator Tool (CAT), unscrew the cap from the hub, lift the cap and slide the hinge arm out of the hinge socket. (Figure No. 2 & 3)
2. On closures equipped with a CAT tool, remove the outer set collar and lift the hinge elbow off the cap pin. (Figure No. 6 & 7)

**Note:** Do not remove inside set collar - this will retain balance for parallel adjustment.

3. Wrap a lifting strap around the hinge elbow near the balance point.
  - 3a. On closures equipped with a roller trolley, lift and pull hinge elbow until the roller trolley clears the stop on the jib arm and remove.
  - 3b. On closures equipped with a dual wheel trolley, place a identifying mark (using a marker, paint, etc.) on the adjustment bolt just above the hinge elbow, or measure the distance from the bottom of the I-beam to the top of the hinge elbow. Remove the adjustment nut, vee-nut block and hinge elbow.

**Note:** Handle the bearing and inner race located in the cap pin bushing on the end of the hinge elbow with care. Remove the bearing and inner race only if necessary. Secure trolley against the post of the jib arm with a clamp to avoid unwanted movement and possible injury while handling.

**Note:** Do not remove the dual wheel trolley from the jib arm.

4. Remove the jib arm from the hinge socket.
 

**Note:** On size 20" and larger closures, be careful not to damage the bronze bushing in the hinge socket and the lower thrust bearing on the end of the jib arm.
5. Using a hook sling, attach the hooks in the holes of a minimum of three (3) cap ribs. Use the Closure Actuator Tool (CAT) to break the seal, if necessary, and unscrew the cap from the hub while lifting the cap enough to maintain a floating position between the cap and hub threads to minimize thread drag. Continue the lifting and turning operation until the cap clears the hub. Place cap face down on a clean, flat surface (plywood or a wood pallet is preferred).

### B. Disassembly of Vertical Hinge Closure (Refer to Figure No. 4, 5, 8 & 9)

1. On closures not equipped with a Closure Actuator Tool (CAT), unscrew the cap from the hub and carefully lift the cap until the davit arm clears the hub. (Figure No. 4 & 5)

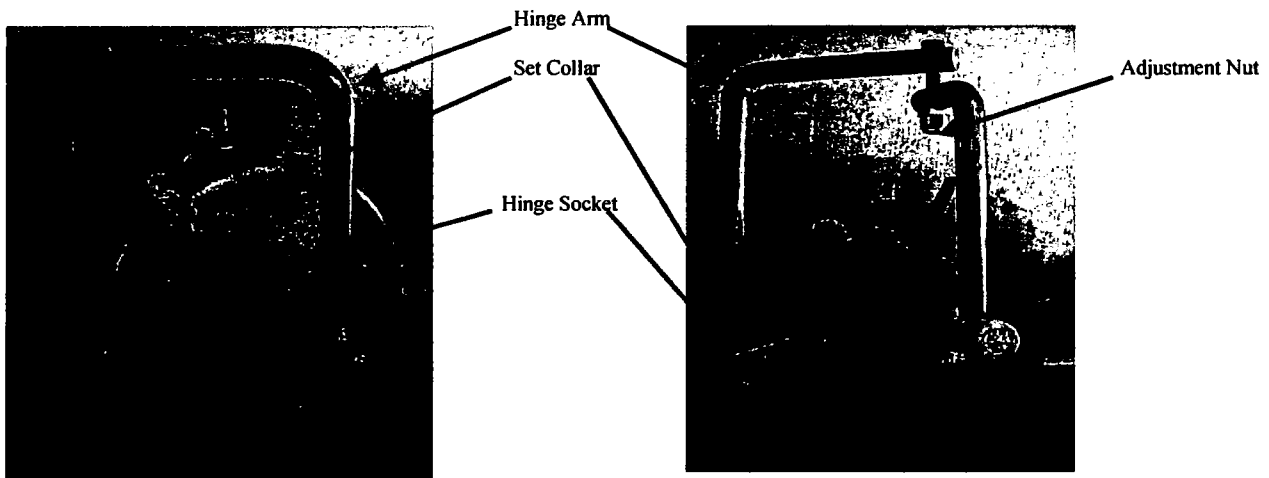
**CAUTION:** Do not attempt to swing the cap to the side. This will cause a weight imbalance and cause the closure to tip over, possibly causing severe injury and damage.

2. On closures equipped with a CAT tool, use the CAT tool to break the seal, if necessary, and unscrew the cap from the hub. (Figure No. 8 & 9)

**CAUTION:** Do not attempt to swing the cap to the side. This will cause a weight imbalance and cause the closure to tip over, possibly causing severe injury and damage.

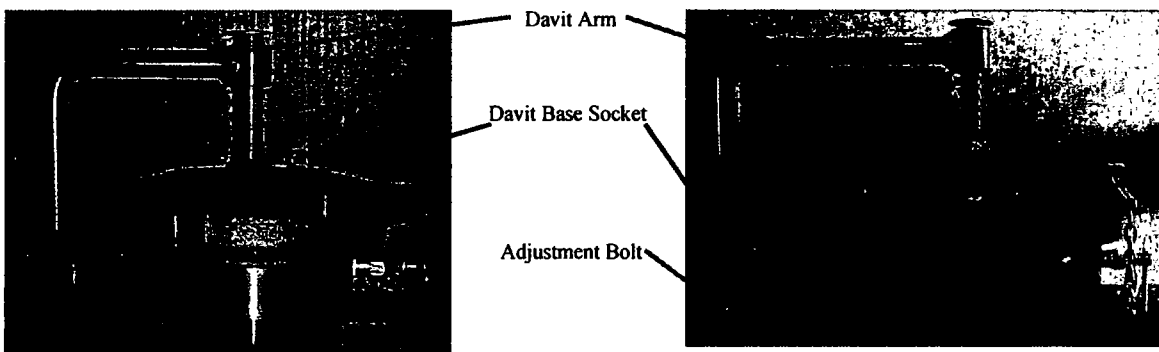
3. Using a hook sling, attach the hooks in the holes of a minimum of three (3) cap ribs. Carefully and slowly lift the cap until the davit arm is out of the davit base.

**Note:** On sizes 26" and larger closures, be careful not to damage the bronze bushing in the davit base and the lower bearing on the end of the davit arm. If post-weld heat treatment is to be performed, the bronze bushing shall be removed. Removal of the dust cover from davit arm is not necessary. Place cap face down on a clean, flat surface that will allow the davit arm to hang free. (Wood pallets are preferred.)



**Figure No. 2**

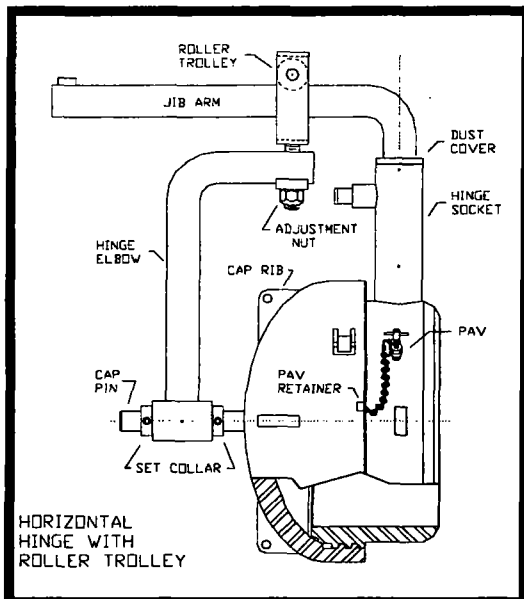
**Figure No. 3**



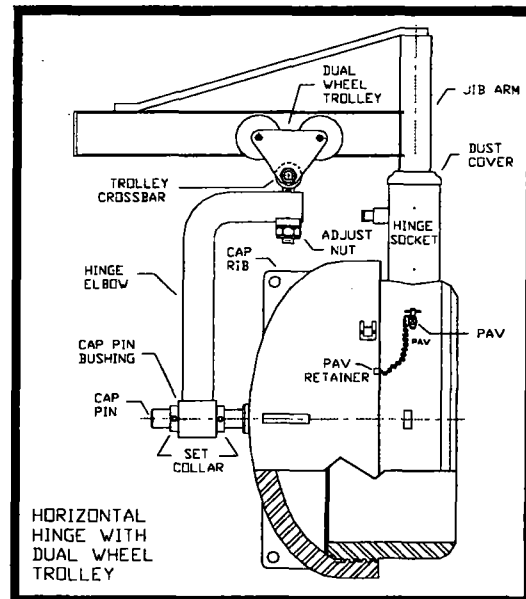
**Figure No. 4**

**Figure No. 5**

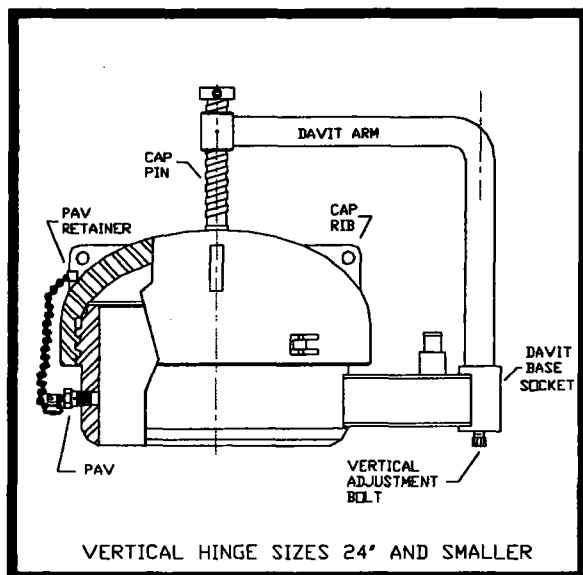




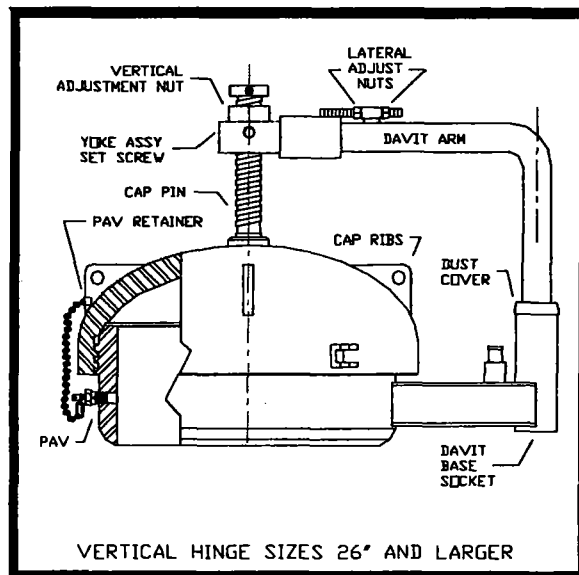
**Figure No. 6**



**Figure No. 7**



**Figure No. 8**



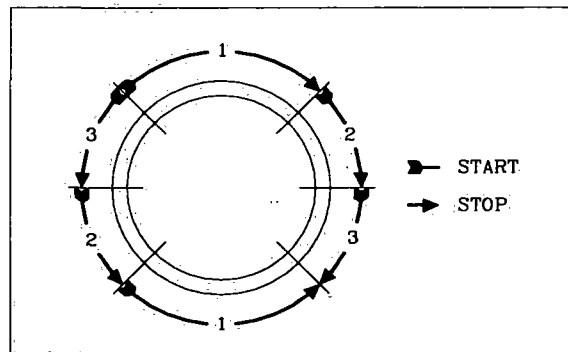
**Figure No. 9**

## SECTION TWO: Attachment of the Closure Hub in Fabrication Shops

### (Automatic Welding)

**NOTE:** All welding should be performed by certified welders using qualified procedures. All nozzles and attachment welds should be completed prior to installing the closure to avoid possible warpage to the hub.

1. Remove the cap, o-ring and pressure alert valve (PAV). Remove the hinge components in accordance with **Section One** of these instructions.
2. Position the hub to the vessel, using internal bracing if necessary, and tack weld.
  - 2a. Hinged closures - Hinge socket must be level vertically.
  - 2b. No hinge closures - PAV must be in the upright position for horizontal installation.
3. Weld stringer bead (a recommended pass sequence is illustrated below). Two (2) or more welders, welding on opposite sides, are recommended on larger diameter closures (16" and up) to minimize the amount of residual stress induced.



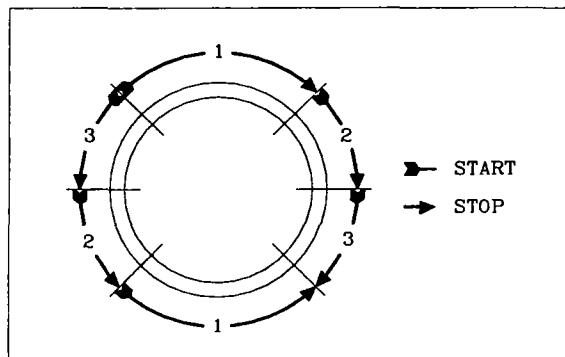
**Recommended Pass Sequence**

4. Complete the hub to vessel weld. **The amount of heat due to welding should be minimized to avoid possible warpage of the hub seal face.**
5. If post-weld heat treatment is to be performed, remove all grease and coat the threads and seal face with an anti-splatter welding compound that will protect against the formation of oxidation scale. **Do not perform post-weld heat treatment on the cap or hinge components.**
6. Replace the PAV, reassemble the closure and make any necessary adjustments as instructed in Section Five of the Closure Operation and Maintenance Instructions.

### **SECTION THREE: Attachment of the Closure Hub in Field (Manual Welding)**

**NOTE:** All welding should be performed by certified welders using qualified procedures. All nozzles and attachment welds should be completed prior to installing the closure to avoid possible warpage to the hub.

1. Remove the cap, o-ring and pressure alert valve (PAV). Remove the hinge components in accordance with **Section One** of these instructions.
2. Position the hub to the vessel (using internal bracing if necessary) and tack weld.
  - 2a. Hinged closures - Hinge socket must be level vertically.
  - 2b. No hinge closures - PAV must be in the upright position for horizontal installation.
3. Weld stringer bead and hot passes (a recommended pass sequence is illustrated below). Two (2) or more welders, welding on opposite sides, are recommended on larger diameter closures (16" and up) to minimize the amount of stress induced. **The amount of heat due to welding should be minimized to avoid possible warpage of the hub seal face.**



**Recommended Pass Sequence**

4. Replace the PAV, reassemble the closure and make any necessary adjustments as instructed in Section Five of the Closure Operation and Maintenance Instructions.

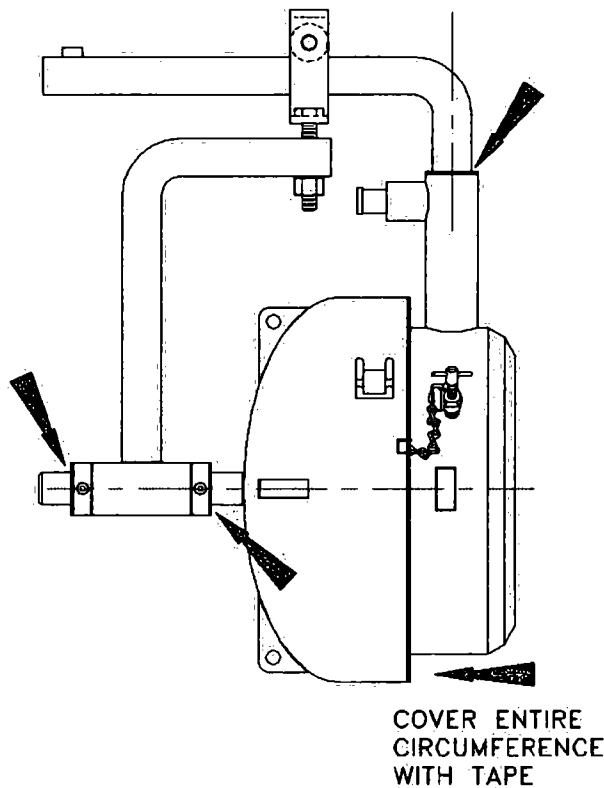
## SECTION FOUR: Sandblasting Precautions

**NOTE:** Sand trapped in the thread, seal and moving part areas may lead to severe galling and operational problems. To prevent sand from becoming trapped in these subject areas, take the following precautions:

1. Mask the critical areas, as illustrated below, with a suitable masking material.

**NOTE:** Duct tape provides one effective means of masking these areas.

2. Avoid sandblasting directly towards the masking.
3. Thoroughly clean the thread, seal and moving part areas after sandblasting.





A Unit of Robbins & Myers, Inc.

***R&M Energy Systems***

10906 FM 2920  
Tomball, Texas, U.S.A. 77375  
(800) 654-5603  
(281) 351-2222  
Fax: (281) 351-6557  
E-mail: [sales@rmenergy.com](mailto:sales@rmenergy.com)

***R&M Energy Systems, Ltd.***

9830 – 45<sup>th</sup> Avenue  
Edmonton, Alberta, Canada T6E 5C5  
(800) 661-5659  
(780) 437-6316  
Fax: (780) 435-3074



A Unit of Robbins & Myers, Inc.

## **YALE® FIGURE 500 & 500R CLOSURE OPERATION AND MAINTENANCE INSTRUCTIONS**

### **IMPORTANT INFORMATION**

#### **Note To Supervisor:**

**Please share this information with your employees and make sure they have received training on closures prior to operation and/or maintenance.**

**/!\ WARNING:** Do not attempt to open the closure while under pressure. Failure to relieve all pressure will allow the contents to escape forcefully and may cause severe injury or even death. Follow all instructions below.

**Closure Installation Instructions** are available under separate cover and are included with each closure shipment. For a copy of these instructions, please contact the **Customer Service Department** at one of the following locations.

#### **IN THE U.S.**

**1-800-654-5603 or (281) 315-2222**

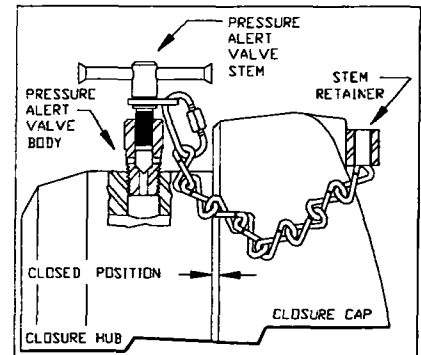
#### **IN CANADA**

**1-800-661-5659 or (780) 437-6318**

## SECTION ONE: Opening the Closure

1. Bleed pressure from pipeline or vessel in a safe manner. Failure to do so may lead to a violent expulsion of pressure resulting in severe injury or even death.
2. If the closure is equipped with a Pressure Alert Valve (PAV), remove the PAV stem from the PAV body. Screw the stem into the retainer on the cap. See **FIGURE No. 1**.

**NOTE:** The PAV is intended to warn the operator of residual pressure in the pipeline or vessel. **The PAV is NOT intended to be used to bleed pressure from the pipeline or vessel.**



**FIGURE No. 1**

**!/\ WARNING:** Unrelieved pressure can cause severe injury or even death. If pressure bleeds from the PAV after the PAV stem has been removed, **DO NOT** open the closure. Replace the stem in the PAV body and tighten. Repeat Steps 1 & 2.

**NOTE:** A PAV is standard equipment on all 6" and larger closures and may be purchased as an option on smaller sizes.

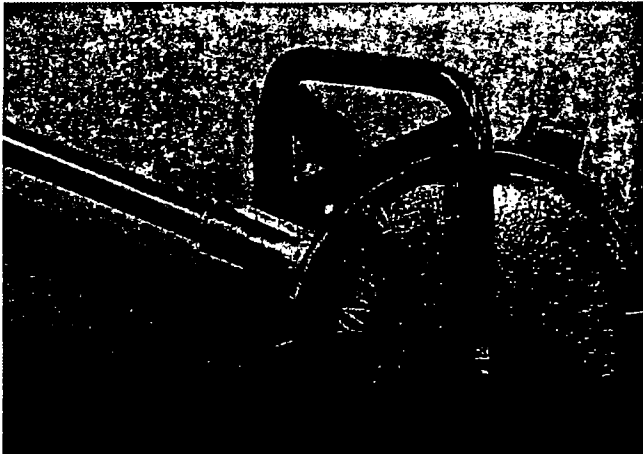
3. Check that reference marks have been made indicating the "Closed Position" of the cap, as illustrated in **FIGURE No. 1** and **FIGURE No. 2**. If not, make a temporary mark across the back of the cap and hub. Then follow the "Initial Start-Up" in **Section Three** for marking the "Closed Position" of the cap. Closures equipped with a Closure Actuator Tool (CAT Tool) contain factory established closed tight reference marks on the hinge socket and cap, as illustrated in **FIGURE No. 2**.
4. The closure has right-hand threads. Loosen the cap by rotating it counter-clockwise, using an optional lug wrench or CAT Tool, as illustrated in **FIGURE No. 3** and **FIGURE No. 5**. **DO NOT** use a metal-faced hammer to loosen the cap. Excessive hammering will significantly deform the lugs as illustrated in **FIGURE No. 4**, and may initiate a crack in the cap or hub.

**NOTE:** Excessive torque to remove the cap may be an indication of unrelieved pressure.

5. Rotate the cap until it is free from the hub.
6. Swing the cap free of the hub to gain access.



**FIGURE No. 2**



**FIGURE No. 3**



**FIGURE No. 4**



**FIGURE No. 5**  
**Proper Operating Position.**

**Always operate the closure from the side as illustrated in FIGURE No. 5.**



**FIGURE No. 6**  
**WRONG Operating Position!**

**NEVER operate the closure while standing in front of the cap as illustrated in FIGURE No. 6.**



## SECTION TWO: Closing the Closure

**CAUTION:** DO NOT overtighten the cap. Overtightening may result in damage to the closure threads and seal areas.

The cap can be tightened sufficiently using an optional lug wrench or Closure Actuator Tool (CAT). DO NOT use a metal-faced hammer to tighten the cap. Excessive hammering will significantly deform the lugs, as illustrated in **FIGURE No. 4**. It may also damage the closure threads and seal areas.

1. Tighten the cap until the reference marks are aligned as illustrated in **FIGURE No. 1**. This indicates metal-to-metal contact between the cap and hub sealing surfaces.
2. On closures with a Pressure Alert Valve (PAV), insert and tighten the PAV stem into the PAV body on the hub.

**CAUTION:** The PAV is designed to be hand-tightened. DO NOT use excessive force to tighten the PAV stem. Excessive torque may damage the PAV.

## SECTION THREE: Initial Start-Up

1. Open the closure as instructed in **Section One**.
2. Remove the o-ring, clean and lubricate the cap and hub threads. An anti-galling lubricant, such as a lithium grease, is recommended for best results. Do not use a silicone type lubricant.
3. With the o-ring removed, tighten the cap until metal-to-metal contact is made between the hub and cap seal surfaces. (This can be determined by observing the cap movement. Stop tightening when the relative motion between the cap and hub has ceased.)
4. Mark this position on the cap and hub for future reference, as illustrated in **FIGURE No. 1**, to indicate the point at which the seal areas are fully engaged.
5. Open the closure and replace the o-ring as instructed in **Section Four**. DO NOT tighten the cap beyond the "Closed Position" reference point. Tightening beyond this point can result in damage to the closure threads and seal areas.

## **SECTION FOUR: Maintenance**

1. Every time the closure is opened, visually inspect the o-ring and the threads of the cap and hub as instructed in **Section Six**. If tears, nicks, cuts or rough surfaces appear on the o-ring, replace it with an o-ring supplied by R&M Energy Systems to ensure the dimensional integrity.
2. Whenever foreign matter exists on the threads or seal areas, remove the o-ring and clean the threads, seal areas and o-ring groove. Lubricate the threads and seal areas with an anti-galling lubricant such as lithium grease. Do not use silicone type lubricant. Do not fill the o-ring groove with lubricant.
3. If cracks are visible on the cap or hub, replace the component.
4. Clean the o-ring and apply a light coating of lubricant to it. Install the o-ring in the groove.
5. Lubricate the cap pin bushing and hinge socket on hinged closures.
6. Refer to **Section 5-C** for necessary adjustments to the hinge.

## **SECTION FIVE: Disassembly and Adjustment of Closure**

**!/\ WARNING:** Do not attempt to disassemble the closure while under pressure. Failure to relieve all pressure may lead to a violent expulsion of the contents. This may lead to severe injury or even death. Remove the PAV stem from the valve body to assure all pressure has been relieved and screw it into the retainer on the cap, as instructed in **Section One, Steps 1 & 2**.

### **A. Disassembly of Horizontal Hinge Closure**

**(Refer To Figure No. 7, 8, 11 & 12)**

1. Use the optional lug wrench or closure actuator tool (CAT) to break the seal. Unscrew the cap from the hub.
2. On closures not equipped with a CAT tool, lift the cap until the hinge arm clears the hinge socket. (Figure No. 7 & 8)
3. On closures equipped with a CAT tool, wrap a lifting strap around the bend of the hinge elbow. (Figure No. 11 & 12)

- 3a. On closures equipped with a roller trolley, lift and pull the hinge elbow until the roller clears the stop on the jib arm and remove. Carefully and slowly place the cap face down on a clean, flat surface. (Plywood or a wood pallet is preferred.)
- 3b. On closures equipped with a dual wheel trolley, place an identifying mark (with a marker, paint, etc.) on the adjustment bolt just above the hinge elbow, or measure the distance from the bottom of the I-beam to the top of the hinge elbow. Lift just enough to take the weight off the vee-nut block and remove the adjustment nut and vee-nut block. Carefully and slowly lower until the hinge elbow is free of the adjustment bolt and place the cap face down on a clean, flat surface. (Plywood or a wood pallet is preferred.) Secure the trolley against the post of the jib arm with a clamp to avoid unwanted movement and possible injury while handling.

**NOTE:** Do not remove the dual wheel trolley from the jib arm.

- 3c. If the jib arm is removed from the hinge socket on sizes 20" and larger closures, be careful not to damage the bronze bushing in the hinge socket or the lower thrust bearing on the end of the jib arm.

## **Reassembly of Horizontal Hinge Closure**

1. Assure that mating parts and bearings are free of all dirt, sand and debris prior to reassembly. On sizes 20" and larger, make sure all removable hinge parts (dust cover, top bronze bushing, bottom bearing) are installed in their respective locations. If removed during disassembly, insert the jib arm in the hinge socket and remove the clamp used in **Step 3b** of the disassembly section.
2. On closures not equipped with a CAT tool, insert the hinge arm into the hinge socket and proceed to **Step 4**.
3. On closures equipped with a CAT tool, wrap a lifting strap around the bend of the hinge elbow.
  - 3a. On closures equipped with a roller trolley, lift until the roller clears the stop on the jib arm and slide on. Ease down until the roller rests on the jib arm and remove the strap.
  - 3b. On closures equipped with a dual wheel trolley, lift and carefully slide the hinge elbow back onto the adjustment bole, install the vee-nut block and the adjustment nut. Tighten to the mark on the adjustment bolt made in **Step 3b** of the disassembly section and remove the strap.

4. Thoroughly clean the cap and hub threads, sealing surfaces and o-ring groove. Lubricate the cap and hub threads, sealing surfaces, and all grease zerks. Apply a light coating of lubricant to the o-ring.

**NOTE:** Do not put lubricant in the o-ring groove.

5. Begin screwing the cap onto the hub while checking vertical and parallel adjustments. The cap should screw onto the hub without thread drag.

## **B. Disassembly of Vertical Hinge Closure**

**(Refer To Figure No. 9, 10, 13 & 14)**

1. Use the optional lug wrench or closure actuator tool (CAT) to break the seal. Unscrew the cap from the hub.
2. On closures smaller than 16", lift the cap until the davit arm clears the davit base socket. (Figure No. 9 & 10)
3. On closures larger than 16", attach the hooks of a hook sling in the holes of a minimum of three (3) cap ribs. Carefully and slowly lift the cap until the davit arm is out of the davit base socket. (Figure No. 13 & 14)

**NOTE:** On sizes 26" and larger closures, be careful not to damage the bronze bushing in the davit base socket and lower bearing on the end of the davit arm. Removal of the dust cover from the davit arm is not necessary. Place the cap face down on a clean, flat surface that will allow the davit arm to hang free. (Wood pallets are preferred.)

## **Reassembly of Vertical Hinge Closure**

1. Assure that mating parts and bearings are free of all dirt, sand and debris prior to reassembly.
  - 1a. On closures smaller than 16", insert the davit arm into the davit base socket until fully seated.
  - 1b. On sizes 16" through 24" closures, lower the davit arm into the davit base socket until fully seated. Position the dust cover against the davit base socket.
  - 1c. On sizes 26" and larger closures, install the bronze bushing in the davit base socket, if removed during **Step 2** of the disassembly section, and carefully lower the davit arm into the davit base socket until fully seated. Position the dust cover against the davit base socket.

2. Thoroughly clean the cap and hub threads, sealing surfaces and o-ring groove. Lubricate the cap and hub threads, sealing surfaces, and all grease zearks. Apply a light coating of lubricant to the o-ring.

**NOTE:** Do not put lubricant in the o-ring groove.

3. Begin screwing the cap onto the hub while checking the vertical and lateral adjustments. The cap should screw onto the hub without thread drag.

### **C. Adjustment of Cap Relative to Hub**

1. Horizontal hinge 8" and smaller: (Refer to Figure No. 7)
  - 1a. Vertical adjustment is made by loosening the set collar and moving it up or down the hinge arm. Retighten the set collar against the hinge socket after adjustment.
2. Horizontal hinge 10" through 14": (Refer to Figure No. 8)
  - 2a. Vertical adjustment is made by tightening or loosening the adjustment nut.
3. Horizontal hinge 16" and larger: (Refer to Figure No. 11 & 12)
  - 3a. Position the cap face approximately two (2) or three (3) inches from the hub face. The cap face must be parallel to the hub face. This can be determined by measuring the distance between the two faces at the top and bottom, or by using a level. Adjustment is made by moving the hinge elbow laterally along the cap pin after loosening one or the other of the two set collars. If the cap is closer at the top, loosen the inside set collar and move the hinge elbow closer to the cap. If the cap is closer at the bottom, loosen the outside set collar and move it out and retighten. Then move the hinge elbow away from the cap. After the adjustment, tighten both set collars against the hinge elbow.

**CAUTION:** Never leave the outer set collar loose. This makes it possible for the cap to slide off the cap pin and drop free.

- 3b. Vertical adjustment is made by tightening or loosening the adjustment nut. Properly adjusted, all the weight of the cap will remain on the hinge elbow and jib arm without transferring any weight to the hub during the thread make-up, thus preventing thread drag.
4. Vertical hinge 8" and smaller: (Refer to Figure No. 9)
  - 4a. No adjustments should be necessary on these small closures.

5. Vertical hinge 10" through 24": (Refer to Figure No. 10 & 13)

- 5a. The adjustment bolt is located on the bottom of the davit base socket. It adjusts the height of the cap relative to the hub to minimize the thread drag while operating the closure. If excessive thread drag is noticed while turning the cap, adjust this bolt in small increments until minimum drag is obtained.

6. Vertical hinge 26" and larger: (Refer to Figure No. 14)

- 6a. Lateral Adjustment – Center the cap with the hub laterally using the adjusting nuts on top of the davit arm adjustment sleeve. Make sure both nuts are tight after completing the adjustment.
- 6b Vertical Adjustment – Loosen the set screw in front of the yoke assembly. Slightly turn the nut on top clockwise to raise the cap, or counter clockwise to lower the cap. Turn the cap to evaluate the thread drag and repeat as necessary until minimum thread drag is obtained. Tighten the set screw after the final adjustment.

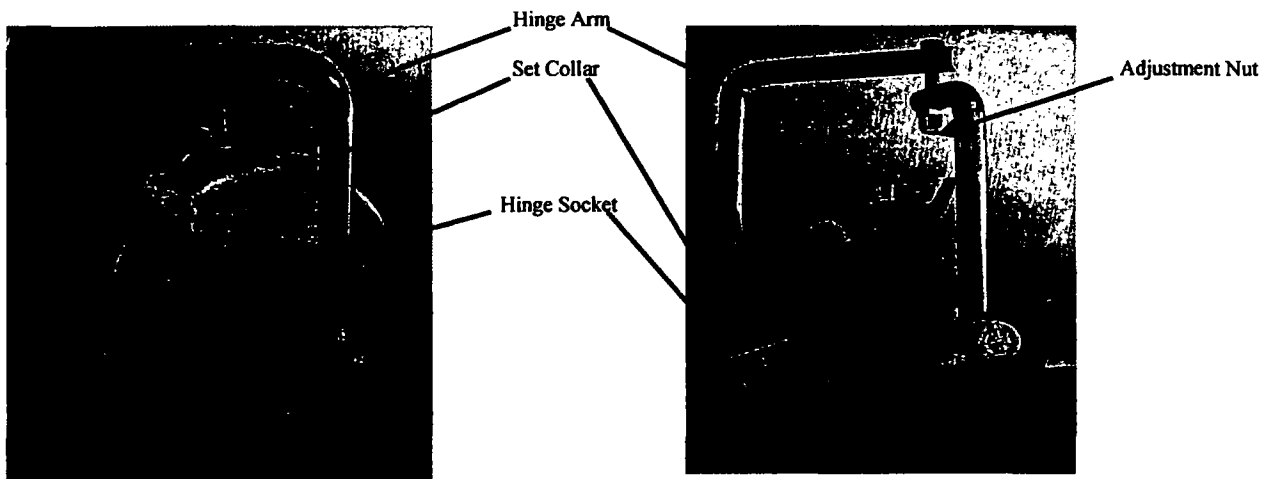


FIGURE No. 7

FIGURE No. 8

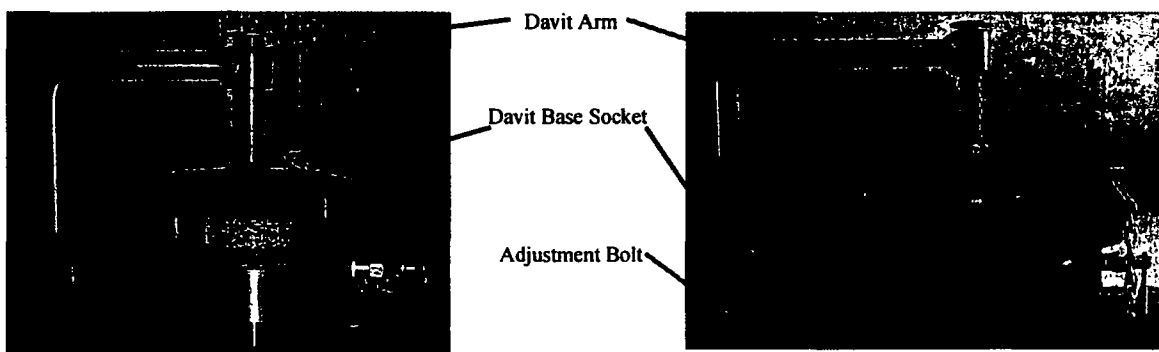
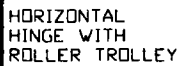


FIGURE No. 9

FIGURE No. 10



HORIZONTAL  
HINGE WITH  
DUAL WHEEL  
TROLLEY

### VERTICAL HINGE SIZES 24' AND SMALLER

### VERTICAL HINGE SIZES 26" AND LARGER

Page 10

## SECTION SIX: Inspection

A thread gauge is available from R&M Energy Systems. It is a template containing five different modified acme thread profiles. The gauge is intended to allow the user to estimate the extent of wear or damage to the closure threads based on a visual comparison of the thread form between the gauge and the closure component.

### *Procedure for Thread Inspection:*

Determine the profile that matches the threads on your closure and snugly insert the gauge into the threads of the closure component. Make a visual comparison of the thread profile to the gauge. Inspect both cap threads and hub threads for the following:

- Worn thread flanks
- Rounded thread crests
- Galling
- Excessive corrosion
- Deformed thread profiles
- Gouges or nicks
- Cracks, especially at the thread root radius

This procedure should be performed, as a minimum, at the 12:00, 3:00, 6:00, and 9:00 o'clock positions on both the cap and hub.

### *Additional Inspections:*

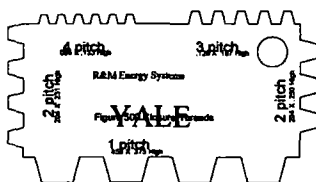
Inspect the cap and hub for the following:

- Gouges, nicks or cracks in the seal area
- Excessive corrosion or wear in the seal area
- Excessive deformation of cap lugs resulting from hammering, etc.
- Cracks on the cap exterior

### *Important Considerations:*

- 1) Equipment containing excessive wear, damage, or cracks should be replaced immediately.
- 2) "Acceptable" wear is dependent upon the closure's environmental conditions including pressure, temperature, media, frequency of use, etc.
- 3) NDE, such as PT, MT, UT and RT, provides a suitable means for detecting cracks.

*Contact your nearest customer service representative with any questions or concerns.*



Thread Gauge



Proper Thread Gauge Fit





A Unit of Robbins & Myers, Inc.

***R&M Energy Systems***

10906 FM 2920

Tomball, Texas, U.S.A. 77375

(800) 654-5603

(281) 351-2222

Fax: (281) 351-6557

E-mail: [sales@rmenergy.com](mailto:sales@rmenergy.com)

***R&M Energy Systems, Ltd.***

9830 – 45<sup>th</sup> Avenue

Edmonton, Alberta, Canada T6E 5C5

(800) 661-5659

(780) 437-6316

Fax: (780) 435-3074



## **Global Heat Transfer Industrial core specifications**

### **Types:**

- $\frac{1}{2}$ " staggered tubes on  $\frac{5}{8}$ " centers, 2 to 8 rows**
- $\frac{3}{4}$ " staggered tubes on  $\frac{5}{8}$ " centers, 2 to 7 rows**
- $\frac{3}{4}$ " staggered tubes on  $\frac{1}{2}$ " centers, 2 to 8 rows**
- $\frac{1}{2}$ " staggered tubes on  $\frac{1}{2}$ " centers, 2 to 8 rows**

### **Materials:**

- Fins: .030 copper or .035 brass ( see samples )**
- Multi louvered or dimpled ( see samples )**
- Leading edges hemmed for strength**
- Corrosion and abrasion solder coating available.**
- Variable fins per inch available 4-6-8-9-10-11 and 12**

### **Tubes: $\frac{1}{2}$ " tubes or $\frac{3}{4}$ " tubes**

- Seamless, smooth or dimpled wall ( see sample )**
- .007 material thickness, heavier upon request**

### **Headers: .050-.090 or .125 brass**

- CNC punched for precision and accuracy.**
- .001 tubes to header tolerances**
- Welding corner or full reinforcement plates.**



## **GLOBAL HEAT TRANSFER LIMITED WARRANTY**

**GLOBAL HEAT TRANSFER RESERVES THE RIGHT FOR CONTINUED PRODUCT AND SERVICE IMPROVEMENT BY CHANGES IN ENGINEERING AND / OR DESIGN AS DEEMED NECESSARY BY GHT, AND GHT IS NOT UNDER ANY OBLIGATION TO INCORPORATE THESE CHANGES IN ANY PRODUCT ALREADY DELIVERED.**

Global Heat Transfer Ltd., referred to hereinafter as GHT, hereby provides and upholds the following warranty for all Industrial and Commercial products manufactured and supplied by GHT. The warranty provides protection against manufacturer's defects, material defect and any defect in workmanship up to and including a period of one year from the date of shipment from the GHT manufacturing plant located in Edmonton, Alberta, Canada.

Any defects resulting in a warranty issue will be limited to the product either being repaired or the product replaced, and this limitation is solely at the discretion and option of GHT. Any and all parts allegedly defective shall be returned to GHT, in the Original Crating/Packaging together with Proof of Purchase, and the parts will be subject to inspection by GHT prior to any repair or replacement. Any service or repair, whether warrantable defect or otherwise, shall be performed at the GHT manufacturing plant located in Edmonton, Alberta, or at an alternative GHT Service branch based solely on the discretion of GHT. GHT does not provide "in-field" service on the product manufactured and supplied by GHT. All insurance and transportation costs are the responsibility of the Customer. Additionally, GHT assumes no liability or costs associated with the removal and re-installation of the allegedly defective product. The warranty on any parts or components supplied by Vendors to GHT shall only be limited to the warranty provided by the specific supplying Vendor. Only the product manufactured and supplied by GHT shall be warranted and GHT provides no warranty for consequential damage, or failure of accessories or related components, resulting from the alleged failed parts or components manufactured and supplied by GHT.

This GHT warranty does not cover failure due to undisclosed or improper application, nor does it cover improper installation or mounting. This GHT warranty will be considered immediately NUL and VOID if any attempts at repair and/or modification are made by the Customer or the Customer's agent.





## **GLOBAL HEAT TRANSFER CARE AND CLEANING OF ENGINE COOLING SYSTEM**

A clean engine cooling system prolongs the life and increases the efficiency of your power unit. The following is a time tested inhibitor and a cleaner with neutralizer recommended by, and available from Global Heat Transfer Ltd.

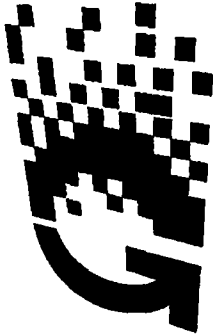
The inhibitor should be used in new installations and after each cleaning. This inhibitor is compatible with ethylene glycol based antifreezes.

The cleaner is a special combination of acid cleaner to remove mineral scale and oxide deposits and a neutralizer to remove oil & neutralize the acid cleaner.

### **USE WITH CAUTION**

A complete treatment for all types closed liquid cooling internal combustion engines.





Global Heat Transfer Ltd.  
7716 – 67 Street  
Edmonton, Alberta  
T6B 2K4  
Phone: (780) 448 – 3600  
Fax: (780) 465 – 8035

## **INSTALLATION & MAINTENANCE INSTRUCTIONS FOR FACTORY ASSEMBLED MWC AND HC AIR COOLED HEAT EXCHANGERS**

### **RECEIVING**

### **INSPECTION**

Inspect the unit for shipping damage (especially the core) before uncrating. Rotate the fan, which should move freely. Note that one blade is wired to the guard on some models for shipping. Remove wire before rotating fan.

### **HANDLING**

Exercise care to avoid damage to the core.

All units are shipped with wood skid facilitating for forklift handling.

Lifting holes are provided in MWC and some HC side members. HC units have integral or removable lifting lugs (shipped unattached on some units)

### **STORAGE**

Units normally have one coat of medium grey, semi – gloss enamel paint. A finish coat of paint should be applied to all exterior ferrous surfaces unless storage is indoors. Do not paint the core as this may impair airflow and heat transfer. All openings are sealed with appropriate pipe plugs, pipe caps, and thread protectors, flange covers and/or pressure caps at the factory. Be sure these are in place.

### **IMPORTANT NOTE**

#### **\*Low Liquid Flow**

Improper circuitry in co-generation, load balance or prime power applications can result in too low of liquid flow through the radiator core, causing hot and cold core areas and induced stress by the way of differentials in thermal expansion.

**\*Thermal Shock**

Hot jacket water suddenly entering cold cores, or cold ambient air suddenly forced over hot cores, can cause severe thermal shock, conditions which can be offset by the use of thermostatically controlled shutters and fan motor controls, two speed fan motors, and heaters and pumps in bypass piping circuit to prewarm cooler core.

Inadequate liquid flow or thermal shock may result in premature failure of a flat tube soldered radiator core.

**\*Sidemember Bolts**

Per sticker located on radiator side members, nuts must be loosened on bolts, which secure MWC top tank or HC floating end tank to side members to permit differential thermal expansion of steel sides and nonferrous core.

**\*Two-Pass/One-Pass Piping**

Smaller radiators may be furnished with a pass partition in one tank, allowing for two-pass liquid flow. Connections on these models must be mainfolded to provide for proper one-pass flow.

**\*Long Term Storage**

Proper precautions must be taken when radiator is stored in a damp or salt-laden atmosphere, particularly with electric motors, which may have their drain holes become corroded and clogged, allowing for accumulation of moisture within the motor housing.

## INSTALLATION

**\*Location**

Insure that no obstructions impede either discharge or inlet air flow. If the unit is wall mounted, provide ample room ventilation. MWC unites should be oriented to take advantage of prevailing winds to avoid recirculation and the resultant loss of cooling effect. Expected wind direction on hot, summer days should especially be anticipated. Duct work on housing of unit adds air flow static resistance which must be overcome with extra fan capacity. Ducting should be larger in area than heat exchanger core face and contain only straight runs and long radius turns.

**\*Foundation and Mounting**

Flexible connections or non-rigid plumbing (hangers and right- angle bends) should be used to allow thermal expansion of core, insulation from vibration and freedom from static loading.

Consult "cooled equipment" manufacturer for recommendations on specific plumbing system. Inlet to heat exchanger is normally at the highest connection, but this is not mandatory.

In the case of round tube cores with counter-flow passes, plumb inlet fluid to connection farthest from blower fan to avoid co-flow of the tube fluid and cooling air.

### **\*Fan Drive System**

If fan is motor driven, check that voltage, frequency and number of phases on motor nameplate are compatible with electrical supply.

Connect motor leads so that rotation of forced draft blower fan is counter-clockwise when viewed from fan side of unit unless fan is supplied with special, left-hand blades.

If drive includes v – belts, sheave alignment and correct belt tension must be maintained to transmit sufficient power to fan and prevent excessive belt and bearing wear.

\*If fan is engine driven, locate the idler sheave on the slack side of the belt drive. Engine packager as required by OSHA provides belt guards.

The assemblies of sheaves and/or fans utilizing taper lock bushings require: clean surfaces, proper alignment of bushing to sheave/fan.

Initially snug the pull-up bolts, assuring correct fit of tapered mated surfaces. With torque wrench, torque bolts in an alternating pattern to recommend torque. With a light hammer, tap between the pull-up bolts, check torque, and if necessary, re-torque to specifications.

### **Recommended Wrench Torque Values**

<b>Bolt Dia.</b>	<b>(lb. ft)</b>	<b>Bolt Dia</b>	<b>(lb. ft)</b>	<b>Bolt Dia</b>	<b>(lb. ft)</b>	<b>Bolt Dia</b>	<b>(lb. ft)</b>
#10	5	3/8	30	5/8	135	1	450
1/4	9	1/2	60	3/4	225	1 1/8	600
5/16	15	9/16	75	7/8	300	1 1/4	750

### **STARTUP**

#### **\*Startup**

\*If tube fluid is water, fill unit from a clean and chemical free source. Use a 50% aqueous ethylene glycol solution if freezing is possible. For ambient conditions below – 25F (-32C) use a 60% solution, below –50F (-45C) consult factory.

\*If Anti-freeze is not used, water should be treated with a corrosion inhibitor.

\*Check unit for undue vibration resulting from fan imbalance or loose drives components.

\*Check torque of tank to header bolts in accordance with values given in table above.

### **MAINTENANCE**

#### **\*Motor**

\*Ball bearings should be lubricated once per year or each nine months for severe duty motors, 10hp or larger. Consult local motor manufacturer representative for grease type specification.

\*Clean ventilation openings as needed.

#### **\*Fan**

\*Clean fan blades once a year. Use stiff brush or air nozzle for loose dirt and non-flammable solvent with brush for solid deposits. Care must be taken not to damage fan

blades as a resulting out-of-balance condition may cause vibration and damage to bearings of motor and/or fan bearing.

**\*Fan Bearings (Vee Belt & External Drive System)**

\*Fan and idler bearings are provided with combination Alemite grease and relief fittings and should be lubricated once per year or more often for severe duty applications.

\*Bearing temperature should never exceed 150 – 160F

**\*Fan Drive**

Refer to Installation – Fan Drive System – The Assembly of Sheaves and/or Fans

\*Check and maintain alignment of sheaves by adjusting their location on fan shaft and idler shaft.

\*Check and maintain correct tension of fan belts by adjusting idler.

\*Check for frame vibration due to fan imbalance, bearing wear or loose drive components.

\*Vibration switches are recommended to detect problems and are available as optional equipment.

**\*Core and Frame**

\*Periodically checks for core or plumbing leakage.

\*Inspect MWC top tank or HC system high point for correct liquid level.

\*Test anti-freeze coolant for correct specific gravity before cold weather.

\*Examine interior of MWC top tank through filler neck for signs of scale formation and rust. Radiator should be cleaned and flushed if necessary. When replacing water in system add a cooling system treatment as a corrosion inhibitor.

\*If steel frame develops rust, clean and repaint as necessary.

\*Dirt accumulation on core can be removed by brushing and blowing with compressed air. A steam jet may also be effectively used if grease deposits are on core.

**Note:** Be careful that fins or tubes are not damaged from rough brushing or excessive jet pressure of either steam or air.

**WARRANTY PROCEDURES**

Please note the following:

\*If a warranty matter occurs, contact the factory service department immediately through your local representative.

\*In all communications with Service Department include complete nameplate data.

\*Units will not be accepted for return unless prior authorization from factory has been obtained