Chromalox®

Installation, Operation
and
MAINTENANCE INSTRUCTIONS

SERVICE REFERENCE	
DIVISION 4	SECTION D
SALES REFERENCE (Supersedes PD431-1)	PD431-2
	161-058060-001
DATE OCTOBER, 1998	

DH, HC, HI, KG, MS, TTSF, TTSFI, TTSFS, WC, WI and WS Flanged Immersion Heaters

GENERAL

DANGER: ***This heater is not intended for use in hazardous atmospheres where flammable vapors, gases, liquids or other combustible atmospheres are present as defined in the National Electrical Code. Failure to comply can result in explosion or fire.***

Chromalox flanged type immersion heaters are ideally suited for industrial and commercial water heating applications where the elements are immersed in water under controlled conditions, such as water boilers and storage tanks.

1. **Heater Construction Characteristics:**
   - **A.** High quality resistance wire held in place by compacted Magnesium Oxide enclosed in a copper, INCOLOY® or stainless steel sheath.
     Note: Proper selection of sheath material is the sole responsibility of the customer.
   - **B.** High to low watt densities.
   - **C.** Brass, stainless steel or steel flange, square, rectangular or round. **Note:** Proper selection of flange material is the sole responsibility of the customer.
   - **D.** Optional thermostat well (not shown).
   - **E.** Optional integral thermostat (not shown).

WARNING: ***An integral thermostat, if provided, is designed for temperature control service only. Because it does not fail safe, it should not be used for temperature limiting duty. Wiring to this device is the responsibility of the user.***

WARNING: ***Users should install adequate back-up controls and safety devices with their electric heating equipment. Where the consequences of failure may be severe, back-up controls are essential. Although the safety of the installation is the responsibility of the user, Chromalox will be glad to assist in making equipment recommendations.***

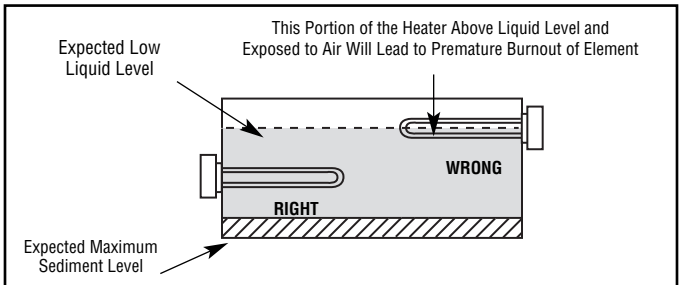
INSTALLATION

WARNING: ***Hazard of Electric Shock. Disconnect all power before installing heater. Install in accordance with the National Electrical Code, NFPA 70.***

1. Before installing, check your immersion heater for any damage that may have occurred during shipment.
2. Check to insure that the line voltage is the same as that stamped on the flange.
3. Do not bend the heating elements. If bending is necessary, check factory.

INSTALLATION

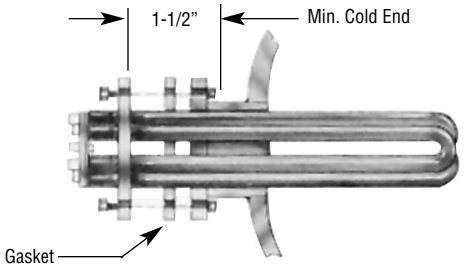
4. **IMPORTANT:** Mount the heater in the tank so the liquid level will always be above the effective heated portion of the heater (see Figure 1). **If the heater is not properly submerged, it may overheat and damage the heating elements and create a possible fire hazard due to excessive sheath temperatures.**



Note: Locate Heater as low as possible for maximum heated water storage capacity. Heat does not move downward.

Figure 1 - Open Tank Installation

5. Where work will pass over or near equipment, additional protection, such as a metal guard, may be needed.



Heavy Tank Walls may be drilled and tapped - if thickness is sufficient to engage 3/4 of threads.

Lighter Tank Walls must be equipped with suitable pipe coupling attached with proper solder or weld material.

WARNING: Care must be taken to insure the heated portion does not extend into the coupling area (see Dimensions).

Figure 2 - Flanged Mounting

6. Heater must not be operated in sludge.
7. The gasket surface must be clean and dry before the heater is sealed. (Figure 2)
8. **Closed Tank Installation**

WARNING: ***When heating in closed vessels, controls and back-up controls must be used to regulate buildup of temperature and/or pressure.***

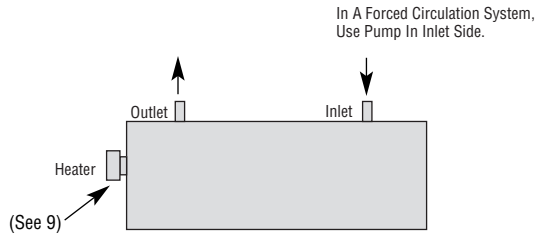


Figure 3 - Closed Tank in Horizontal Position

A. Horizontal Position (Figure 3)

A1. Place heater at an elevation so that natural circulation can take place.

A2. Position outlet and inlet in a vertical plane, facing upward to prevent air pockets. Be sure all trapped air is removed from the closed tank. Bleed the air out of the liquid piping system and heater housing prior to operation.

A3. IMPORTANT: Heater should never be located at the highest point of the water system. Provide expansion tank, if necessary.

B. Vertical Position (Figure 4)

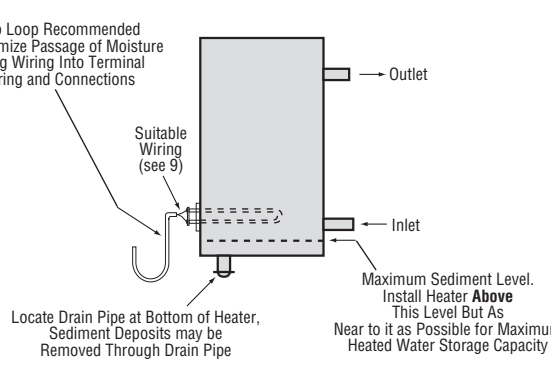


Figure 4 - Closed Tank in Vertical Position

9. **WARNING:** ***Hazard of Electrical Shock. Exposed electrical terminals must be properly guarded to prevent electrical shock.***

10. **DANGER:** ***Hazard of Fire — Since the heaters are capable of developing high temperatures, extreme care should be taken to:***
    A. Avoid contact between heater and combustible materials.
    B. Keep combustible materials far enough away to be free of the effects of high temperatures.

WARNING: ***Provisions should be made to prevent damage from any eventual leaking of tank or components.***

WIRING

WARNING: ***Hazard of Electric Shock. Any installation involving electric heaters must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.***

1. Electrical wiring to heater must be installed in accordance with the National Electrical Code and with local codes by a qualified person. **WARNING:** ***Use copper conductors only.***
2. When element wattages are not equal, heaters must not be connected in series.
3. Connect line wires as shown in the wiring diagrams. (Figure 5 thru 13)

WIRING DIAGRAMS

3 Elements	3 Elements	3 Elements

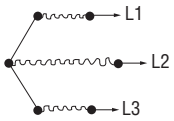
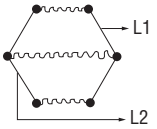
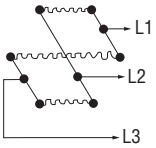

		

Figure 5 **208-480V, 3Ø Y**	**Figure 6** **208-480V, 1Ø**	**Figure 7** **208-480V, 3Ø Δ**
3 Elements	**2 Elements**	**2 Elements**

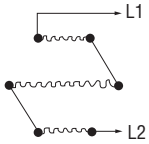
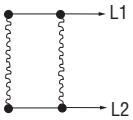
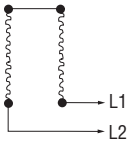

		

Figure 8 **380-480V, 1Ø Series**	**Figure 9** **208-480V, 1Ø**	**Figure 10** **208-480V, 1Ø Series Connected**
6 Elements	**6 Elements**	**6 Elements**

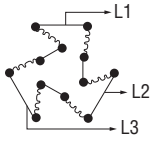
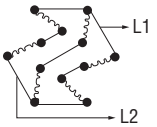
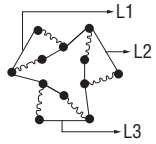

		

Figure 11 **380-480V, 3Ø Series Δ**	**Figure 12** **380-480V, 1Ø Series**	**Figure 13** **208-480V, 3Ø Parallel Δ**

OPERATION

1. Do not operate heaters at voltages in excess of that stamped on the heater since excess voltage will shorten heater life.
2. Always maintain a minimum of 2" of water above the heated portion of the element to prevent exposure of the effective heated length. If the heater is not properly submerged, it may overheat and shorten heater life. DO NOT OPERATE HEATER IF DRY.
3. Be sure all trapped air is removed from a closed tank. Bleed the air out of the liquid piping system and heater housing prior to energizing.
   Note: The tank or heating chamber in closed tank systems must be kept filled with liquid at all times.
4. Keep heating elements above sediment deposits.
5. **Low Megohm Condition —** The refractory material used in electric heaters may absorb moisture during transit or when subject to a humid environment. This moisture absorption results in a cold insulation resistance of less than twenty megohms. Normally, this megohm value corrects itself after heat-up and does not affect heater efficiency or life.

   A low megohm condition can easily be corrected by baking the heater in an oven at 350˚F for several hours, preferably overnight.

   An alternate procedure is to energize the heaters at low voltage until the megohm reading returns to normal. When energizing heaters in air, the sheath temperatures should not exceed 400˚F for copper and 750˚F for alloy elements.

MAINTENANCE

WARNING: ***Hazard of Severe Shock. Disconnect all power to heater before servicing or replacing heaters.***

1. Heaters should be checked periodically for coatings and corrosion and cleaned if necessary.
2. The tank should be checked regularly for sediment around the heater as sediment can act as an insulator and shorten heater life.
3. Remove any accumulated sludge deposits from heater and from tank.
4. Check for loose terminal connections and tighten if necessary.
5. Clean terminal ends of all contamination.

Limited Warranty:
Please refer to the Chromalox limited warranty applicable to this product at
http://www.chromalox.com/customer-service/policies/termsofsale.aspx.

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