

# Installation

## **Receiving and Inspection**

1. Equipment should be checked against the Bill of Lading to verify that the number of pieces received matches those shipped.
2. Equipment should be carefully inspected for damage resulting from shipment.
3. Shortage or damage must be listed on the shipping firm's Bill of Lading. Do not offload without permission or inspection by the carrier. Notify Water King within 24 hours of the discovery of any shortage or damage. If it is possible, take pictures prior to unloading the equipment.
4. Concealed damage or shortage resulting from shipment must be reported to Water King within 10 working days.
5. Inspect for road contamination. Shipments made during winter months are subject to salt spray. Salt spray will cause damage if allowed to remain on the equipment. If salt contamination is noticed, carefully flush with fresh water to prevent damage. Inspect junction boxes or electrical equipment after flushing. If salt has entered these devices, contact Water King.
6. Plan your lift prior to off-loading the equipment. Proper handling and rigging of the equipment will prevent damage during off-loading and contribute to a safe lift.

## **Storage of Water Treatment Media**

1. Water treatment media must be stored in the original container to maintain moisture content. Media shall be stored on a clean, dry surface and covered to prevent contamination. If containers become broken, the media must be re-bagged or sealed to prevent contamination.
2. If the media must be stored outside, it must be covered to keep all rain and direct sunlight off the stored media. The media shall be stored on a clean, dry surface in an area not subjected to flooding during heavy rain.
3. Storage of media should be away from the construction area. No sandblasting or spray painting should be done in the storage area. No welding or burning should be permitted near the stored media.
4. Media must be stored away from chemicals, ill smelling articles or oxidizing agents, to prevent fumes from contaminating the media. Damage to media could occur from contact with chemicals.

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### **Pre-Installation and Location Check List**

1. Water Pressure. 25 psi minimum is required. If pressure is over 100 psi, a pressure reducing valve should be installed.
2. Drain. The unit should be located close to a drain. The drain must be capable of disposing of water at the unit backwash rate for up to 20 minutes. An air gap at the drain is recommended to eliminate the possibility of backflow.
3. Space requirements. Make sure adequate floor space and headroom is available. The brine tank must be accessible to allow loading and unloading of salt. System valves and controls must be accessible for operation and maintenance.
4. Access. Make certain the pieces of the softener will fit through the doors and openings of the buildings in which they will be installed. Pay particular attention for skid mounted systems.
5. Floor. Locate the conditioner on a firm level foundation, preferable concrete. Provide a method for anchoring the mineral tanks to the floor or wall to prevent tipping.
6. Pipe supports. Plan for pipe supports and routing of interconnecting piping for the water treatment system.
7. Electrical requirements. 120 volt, 60 Hz, 3 amps per valve. Export Model 220V, 50 Hz, 1.5 amps per valve.
8. Brine Tank. Make sure the floor on which the brine tank will stand is smooth and level. If not, make a platform from  $\frac{3}{4}$ " marine plywood and shim it to level. This will protect the brine tank. The brine tank is normally placed about 6 inches from the conditioner tank however, it may be located up to 20 feet away.
9. Temperature. Do not locate the conditioner where it or its connections may be subjected to freezing temperature.
10. Environmental Conditions. Avoid placing the treatment system adjacent to chemical storage or in corrosive environments. Most systems are located inside a building or at least under a shed to protect equipment and operators from the elements.
11. Floor loads. The tanks will be full of water during normal operation. Structural design of slabs and buildings must accommodate the weight of the treatment system components.

## Installation

1. General
  - a. Water King is not the installing contractor. Proper installation is essential to proper system operation. Water King is not responsible for any work on site.
2. Place and Anchor Mineral Tanks and Brine Tanks
  - a. Following the construction drawings (by others), locate and mark the floor to indicate skid and equipment placement. Skids and tanks must be level and plumb in all directions before piping, tubing or electrical work may proceed.
  - b. Brine Tank Location. Locate the brine tank as close to the conditioner tank as possible. Be sure tank is on a flat, level surface free of sharp objects. Turn the tank so that the brine valve will be located at the side nearest the conditioner tank. The brine valve should be accessible, but not located where salt may accidentally be poured into the brine well. Connect the brine line tubing or customer supplied brine line between the Taskmaster III valve and the brine valve or brine director.
3. Install Piping
  - a. Reference Typical Piping Arrangements in this manual.
  - b. Proper Pipe Supports. Skid-mounted piping equipment will not adequately support the interconnecting piping. Additional supporting of the interconnecting piping will be necessary.
  - c. All inlet and outlet piping should be anchored or supported adequately to avoid stress on the control system. Follow good plumbing practices and conform to local codes. Provide shut-offs and emergency bypass of unconditioned water in the event the unit requires servicing. The inlet and outlet on the Task Master III valve have arrows to indicate flow direction.
  - d. Install shut off kit. (Optional) Some systems have a shut off kit on each vessel to prevent hard water bypass during regeneration. These consist of a solenoid operated diaphragm valve. Reference the cut sheets for the shut off kits for installation instructions.
  - e. Install air supply. Air supplies must be connected in accordance with the detailed drawings. Care must be used to prevent over pressurizing any of the individual devices. (Optional)
  - f. Install Brine / Regenerant Line. The 1/2-inch NPT regenerant connection is located between the inlet and outlet pipe connections of the control valve. Regenerant line diameter should be no smaller than 1/2 inch. The regenerant line should be self-supporting. Regenerant line length should be less than 20 feet (6 meters) with a maximum lift of 6 feet (1.8 meters) to assure unrestricted regenerant draw. Consult factory for installations outside of these recommendations.
  - g. A float type regenerant valve must be used in the regenerant tank to control salt dosage as well as for safety purposes. Since the regenerant line is normally pressurized, a manual shut-off valve should be installed to facilitate regenerant system servicing.
  - h. Install Drain Line. The drain line housing is available in either 3/4 or 1-1/2 inch, NPT or BSPT. Waste piping and drains must be of adequate size.
4. Install Resin in Mineral Tank
  - a. Reference resin loading instructions.
5. Install Electrical
  - a. Electrical connections (by others) must be in compliance with applicable building and electrical codes.
  - b. Reference wiring diagram for installation instructions.
  - c. Control Panel. All terminations inside the main control panel and the solenoid valve panels are to the terminal blocks.
  - d. Interconnecting wiring is between the terminal blocks on separate control panels or from outside sources such as power connections or supervisory control networks.

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- e. All wiring must be complete prior to start up of the equipment.
  - f. A qualified electrician shall complete all wiring.
  - g. An uninterrupted power supply is required for PLC equipment.
6. Place System in Operation
- a. Set the regeneration cycle of the controller.
  - b. After the controller has been programmed, manually cycle the controller and check for proper operation.
  - c. Open inlet valve. Fill system with water. As water enters the vessels, air trapped in the system must be released through vent valves on top of filters. Set the controller to service position and allow the effluent to drain for a few minutes to release any media fines and debris in pipes.
  - d. Check system connections for any leaks. Repair if necessary and repeat the start-up procedure.
  - e. Manually cycle controller and check for proper sequencing of valves. Do not leave in backwash position for any length of time until you are positive all air is out of system and the system has test cycled through 3 or 4 quick manual sequencing.
  - f. Close all normally closed manual valves and open all normally open manual valves.

To avoid improper operation of the equipment the following **drain line precautions** should be observed:

- ◆ Drain line piping should be same size as flow control, do not reduce pipe size.
- ◆ Overall drain line length less than 20 feet (6.1 m).
- ◆ Do not install manual valves in the drain line.
- ◆ Minimize number of elbows and fittings.
- ◆ Piping must be self supporting.
- ◆ Install vacuum break if drain line siphon is likely.
- ◆ Provide air gap to comply with plumbing code.

**Operation Prior to Acceptance by Owner**

1. CONTINUOUSLY monitor the service flow rate of the system. A large drop in outlet pressure indicates that the softener may be clogged and should be immediately backwashed. Manually advance the positions on the controller to backwash the vessel.
2. Lower flow rates and pressure can cause channeling where the water finds a path of least resistance through the media allowing water to escape un-softened.
3. REGULARLY monitor the flow rate of the backwash supply. Ensure that the flow control continues to operate properly. The recommended backwash rate must be maintained to clean the media but not be exceeded to prevent media loss. The backwash flow control should be removed and cleaned periodically.
4. INSPECT the system to see that all mechanical equipment is operating. Become familiar with the sound of properly running mechanical items. This will aid in early detection of faulty equipment.
5. To avoid introducing discolored water into the users system, a complete regeneration cycle should be completed before placing the unit into service.

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### Inspecting, protecting and installing mineral tank internals

1. After the piping is located, as discussed in the previous section, and the system is ready for water, inspect the tank internals.
2. Enter each tank and check the integrity of all supports, laterals, nuts, and bolts. It may be necessary to remove a lateral from the upper distributor to gain access to the underdrain distributor. Make certain a gasket has been installed at all flange connections and that the fasteners for these flanges are tight. Confirm replacement of the lateral and tighten any supports before exiting the tank.
3. Vessel walls may be lined. Care must be exercised when entering and performing work inside of the vessels. Soft-soled shoes must be worn. Prevent tools from striking the vessel interior.
4. Do not weld on the interior or exterior of the vessel.

### Flushing and Pressure Testing

1. **Flushing Piping.** Flushing of newly constructed piping is necessary to remove dirt and objects accumulated during fabrication. Flushing into a filter or softener vessel must be avoided to prevent damage to the vessel, vessel lining or interior components. Piping should be blanked or, if possible, disconnected from the vessel prior to flushing.
2. **Cleaning Chemical Tanks.** Chemical storage tanks should be cleaned of all debris prior to loading chemicals. Wipe the tank interior and be sure the tank is dry prior to loading chemicals.
3. **Pressure Testing Piping and Tanks.** Once the piping has been flushed, the tank and its face piping may be pressure tested at the normal operating pressure.
4. We recommend that all pipes up to the tank interior be flushed to prevent sand and other material that may be present in the piping of new installation from entering the inside of the underdrain system.
5. Fill the tank through the inlet distributor.
6. Vent air from the tank at the top.
7. Pressure test the tank and piping by applying pressure to the system. Observe and record the system pressure. Visually inspect for leaks. Observe the system pressure after 1 hour. If the pressure is within  $\pm 3$  psi of the original observation then proceed. If the pressure has dropped then the system is leaking. Find the leak, repair, and repeat the procedure. **Record this data** as proof that the piping did not leak after installation.
8. Once the tank and piping have been pressure tested, the tank should be drained and the interior inspected for debris and/or sediments in the bottom or on the walls of the vessel. Wipe the walls and bottom clean to remove any debris present.
9. Bolted flanges and screwed joints may become loose during shipping and installation. If a leak occurs near a pipe support, it may be necessary to loosen the various bolted pieces, in the area of the leak, align the flange faces and tighten the bolts to stop the leak. It is the installing contractor's responsibility to tighten leaking flanges or joints.

**Caution** - Water treatment vessels are confined spaces. Refer to your company or agency safety manual prior to entering a tank

## Installation of Gravel Underbedding

1. Count and place the gravel in a convenient place close to the filter to be loaded. Plan ahead for lifting equipment and other facilities required to safely load the media.
2. Remove any hand holes or man way covers and inspect the interior of tank for debris. Check the under-drain system for tightness of strainers and fittings.
3. Check for broken laterals or underdrains.
4. The interior should be clean. A clean tank is required to avoid contamination of the produced water. Swabbing the inside of the tank with a 50-ppm chlorine solution and allowing it to stand for one hour may disinfect the tank. Then rinse the tank with potable water.
5. Inspect the interior coating for damage or holidays.
6. Install the gravel in layers. Level the gravel support bed through the side openings of the tank. Gravel must be loaded carefully to prevent underdrain damage. If more than one size of gravel is used, each layer should be loaded and leveled individually (larger gravel at bottom, size decreasing upward). Gravel layers are shown in the Tank Drawings section. Since water is a natural level, filling the lower tank dome with water up to the gravel line facilitates leveling. When installing material smaller than ½" Gravel, workers should not stand directly on material. Boards or plywood should be used to support weight. It is important that all indentations or footprints are removed and the proper depth be met before loading the next layer. Make sure the laterals are covered with gravel.
7. Replace and secure the side opening cover. The sealing surfaces should be smooth and clean. Carefully center the gasket and make sure there is no gravel lodged between the tank, gasket, and cover. Tighten the manhole securely to seat the gasket.
8. Washing the Gravel Bed: Prior to loading the filtering material, the gravel bed must be washed. Allow the water to slowly enter the vessel through the underdrain system. Once the tank is completely full of water, increase the backwash flow to the specified backwash flow from supporting documentation. Backwash the gravel for 5 to 10 minutes. Drain the tank and inspect for debris on gravel surface. Any debris must be removed.

**CAUTION:** Care should be taken to prevent any portion of bags or shipping containers from entering the vessel, as this can cause excessive pressure loss and/or channeling of water during service run.

**WARNING:** Gravel dust contains free silica, which is hazardous to your health. Precautions should be taken to prevent breathing of dust when loading.

## Installation of Ion Exchange Resin

1. Remove all hand-hole or man-way covers and inspect the interior of tank for debris. The Interior should be reasonably clean. Make certain the gravel bed has been properly installed and is level and free of debris. Check the under drain system for tightness of fittings and very carefully inspect for damage that may have occurred in shipment.
2. Carefully load the Resin through the top opening of the tank. Check specifications for exact quantities. Gravel layers are shown in project drawings. There is no need for leveling.
3. Replace and secure the top opening cover. The sealing surfaces should be smooth and clean. Carefully center the gasket and make sure there is no gravel lodged between the tank, gasket, and cover. Tighten the manhole securely to seat the gasket.
4. Remove all MEDIA from the top of the tank and man-way. Fill the tank with water and allow the unit to stand a minimum of four (4) hours before backwashing or placing the unit in service. This is to allow the MEDIA to absorb water and to prevent it from being washed to the drain during the initial backwash.
5. After soaking, replace the top cover until the unit is ready for start-up.
6. Brown, Gold or discolored water is normal during initial backwash and rinse cycles. This should clear within a few minutes. After clear water is noted during all cycles, equipment is ready to put on line.

**ATTENTION:** Media should be no more than 2/3 full.

# Hydrostatic Test Report

DATE: \_\_\_\_\_

JOB NO: \_\_\_\_\_

1. CUSTOMER NAME: \_\_\_\_\_

2. PROJECT: \_\_\_\_\_

3. EQUIPMENT IDENTIFICATION:

\_\_\_\_\_

\_\_\_\_\_

4. DESIGN PRESSURE: \_\_\_\_\_

5. MAXIMUM WORKING PRESSURE: \_\_\_\_\_

6. TEST PRESSURE: \_\_\_\_\_

7. AMBIENT TEMPERATURE (START): \_\_\_\_\_

8. AMBIENT TEMPERATURE (END): \_\_\_\_\_

9. CHART RECORDER IDENTIFICATION

INFORMATION (if applicable):

\_\_\_\_\_

\_\_\_\_\_

10. CONDUCTED BY: \_\_\_\_\_

11. APPROVED BY: \_\_\_\_\_

Time	Pressure (psi)
+00:05	
+00:10	
+00:15	
+00:20	
+00:25	
+00:30	
+00:35	
+00:40	
+00:45	
+00:50	
+00:55	
+01:00	
+01:10	
+01:20	