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* * * WARNING * * *

THE DURA TANK YOU HAVE PURCHASED MUST BE PROPERLY INSTALLED AND GROUNDED BY YOUR ELECTRICIAN TO PROTECT THE TANK FROM LIGHTNING STRIKES.

LIGHTNING DAMAGE TO THE ELECTRICAL COMPONENTS IS NOT COVERED BY WARRANTY. DUE TO THE VIOLENT AND UNPREDICTABLE NATURE OF LIGHTNING STRIKES, DURACO DOES NOT WARRANTY ANY TANK DAMAGE CAUSED BY LIGHTNING STRIKES, EVEN THOSE EQUIPPED WITH THE LIGHTNING PROTECTION PACKAGE.

* * * CAUTION * * *

ABOVE GROUND STORAGE TANK INDUSTRY STANDARDS RECOMMEND A HYDRO TEST OF THE TANK UPON FINAL INSTALLATION. HYDRO TEST SHOULD BE COMPLETED AT FULL VOLUME IMMEDIATELY AFTER FINAL INSTALLATION.

*** WARNING ***

EMULSIONS CONTAIN SOME MILD CORROSIVE ELEMENTS THAT CAN GROW IN CONCENTRATION AT THE BOTTOM OF THE DURATANK.

FAILURE TO EMPTY ALL CONTENTS OF TANK AND COMPLETELY CLEAN THE INSIDE EVERY TWO YEARS COULD RESULT IN PERMANENT DAMAGE TO THE STRUCTURE OF THE TANK.

PRE-HEATING THE TANK

If the DuraTank is equipped with blanket heating elements, it is recommended that the tank be pre-heated for 1-2 days before emulsion delivery. To do this, merely turn the tank on and adjust thermostat to desired temperature.

SETTING THE TANK TEMPERATURE

The control module is pre-set at the factory for a maximum temperature of 200 or 400 degrees Fahrenheit, dependent upon customer specifications.

The control module on the DuraTank works just like a household thermostat. To set the temperature at the level you want to store emulsion, use only the up and down arrows on the control display until desired temperature shows on the display. The “PV” is the present temperature in the tank, where “SV” is the set, or desired, temperature in the tank.

All other functions are locked.

If you encounter problems with your tank or control system, please contact the factory.

The control module installed in this panel is factory pre-set at 50º Fahrenheit low temperature limit. If your tank temperature drops to or below this temperature level, the agitator motor will not operate until temperature increases above 50º Fahrenheit. When your tank temperature increases above 50º power to the agitator will be restored and you will have to reset the clock time on your timer. This is done to protect the agitation system from attempting to mix thick emulsion.

The control module installed in this panel is factory preset at 200º or 400º Fahrenheit high temperature limit dependent upon customer specifications for limits. If the tank should heat past customer set temperature, the control module will cut power to the heaters and they will remain off until temperature drops back below set level.

Heating blankets are standard on DuraTanks. They are rated at 1000 watts and are attached to the tank with adhesive. The tank may come with four, six, eight, or ten blankets, depending upon size and location.

HEATING ELEMENT PART NUMBERS:

130701	240V STORAGE TANK HEATING BLANKET (1 kW)
130824	208V STORAGE TANK HEATING BLANKET (1 kW)
130825	480V STORAGE TANK HEATING BLANKET (1 kW)
155573	RED HI TEMP SILICONE ADHESIVE (ONE TUBE WILL COVER TWO HEATING BLANKETS)
122861	240V PROBE TUBE HEATER (4 kW)
130651	208V PROBE TUBE HEATER (4 kW)
130650	480V PROBE TUBE HEATER (4 kW)

DuraTank
Operating Instructions

WARNING!!
ALL SURFACES, MATERIAL AND EQUIPMENT SHOULD BE CONSIDERED TO BE HOT. WEAR PROTECTIVE GLOVES AND CLOTHING TO PREVENT BURNS

FILLING THE DURATANK FROM THE TRANSPORT TANKER

1. **CONNECT HOSE FROM TRANSPORT TANKER TO QUICK DISCONNECT OF VALVE #1 ON SIDE OF DURATANK.**
2. **OPEN FILL VALVE #1 ON DURATANK AND VALVE ON TRANSPORT TANKER.**
3. **START PUMP ON TRANSPORT TANKER.**
4. **WATCH TANK LEVEL GAUGE ON THE DURATANK TO PROTECT AGAINST OVERFILLING.**
5. **WHEN FILL IS ACHIEVED, CLOSE VALVE ON TRANSPORT TANKER.**
6. **TURN OFF PUMP.**
7. **CLOSE FILL VALVE #1 ON DURATANK.**
8. **OPEN VALVE #2 (RELIEF VALVE) ON DURATANK**
9. **OPEN VALVE ON TRANSPORT TANKER.**
10. **REVERSE PUMP ON TRANSPORT TANKER MOMENTARILY TO DRAW EMULSION OUT OF HOSE.**
11. **CLOSE VALVE #2 ON DURATANK AND TRANSPORT TANKER VALVE.**
12. **DISCONNECT HOSE FROM DURATANK AND REPLACE CAP.**

OFFLOADING EMULSION FROM DISCHARGE VALVE

1. **REMOVE CAP AND ATTACH 3” LOADER HOSE TO DISCHARGE VALVE #3 QUICK DISCONNECT.**
2. **PLACE OPPOSITE END IN TANK BEING FILLED.**
3. **OPEN 3” DISCHARGE VALVE #3.**
4. **WHEN COMPLETED FILLING, SHUT VALVE #3 OFF.**
5. **OPEN 1” BLEEDER VALVE #4 ON DISCHARGE SIDE TO HELP DRAIN 3” HOSE.**
6. **CLOSE 1” BLEEDER VALVE #4.**
7. **REMOVE LOADER HOSE.**
8. **REPLACE CAP ON QUICK DISCONNECT.**
9. **CLEAN AND STORE LOADER HOSE.**

ATTENTION:

Turning the Pump Switch to the Forward position will offload product out of the DURATANK.

Turning the Pump Switch to the Reverse position will load product into the DURATANK.

CAUTION:

IF YOUR DURATANK IS EQUIPPED WITH A PUMP:

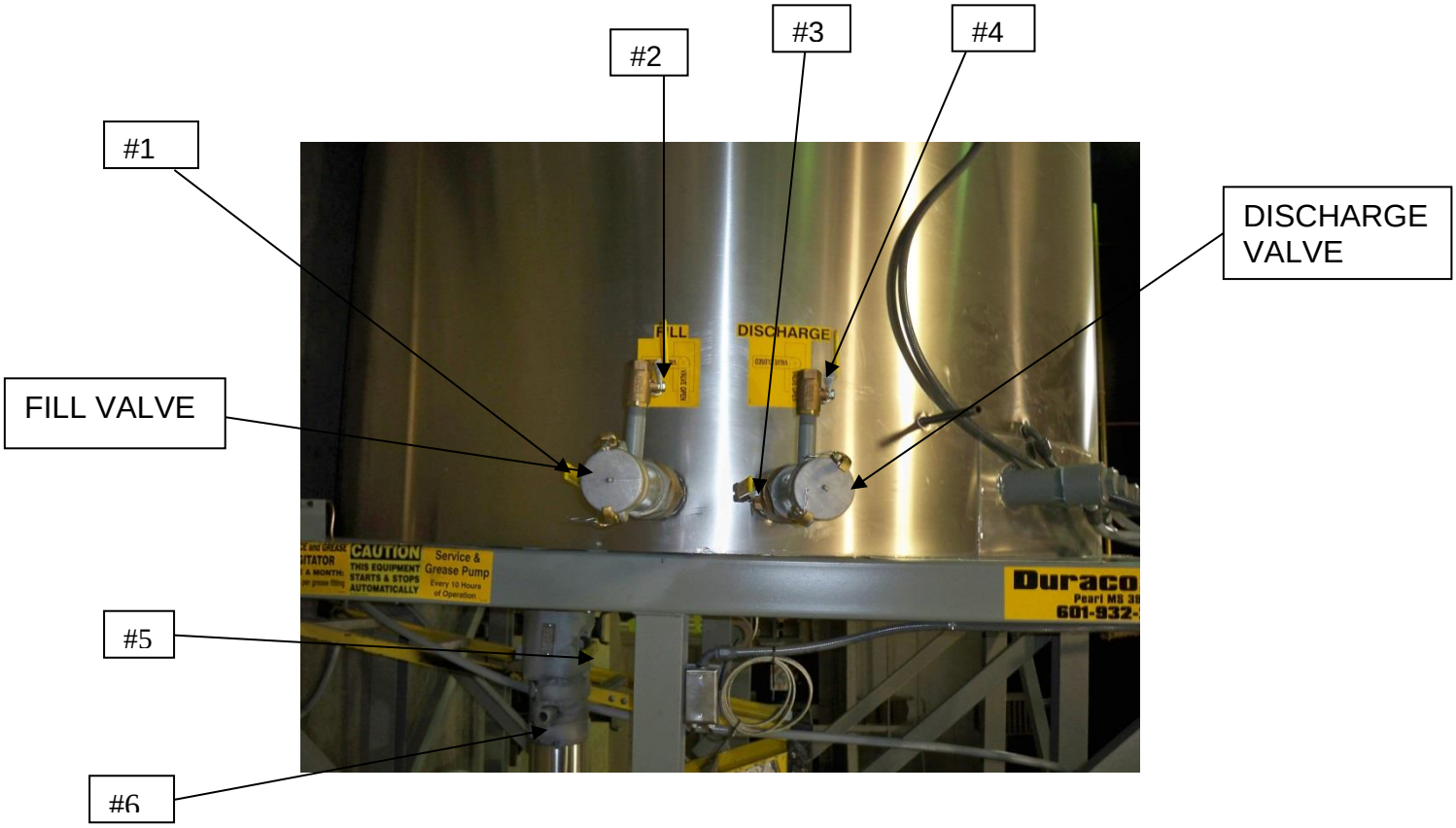
UPON COMPLETION OF LOADING OR

OFFLOADING EMULSION USING THE PUMP

ALLOW MOTOR TO COME TO A <u>COMPLETE</u> <u>STOP</u>

***BEFORE* REVERSING MOTOR.**

FAILURE TO DO SO WILL SEVERELY DAMAGE CONTROLS !



FILLING THE DURATANK WITH THE STORAGE TANK PUMP

1. **CONNECT THE LOADER HOSE FROM THE DURATANK PUMP TO TRANSPORT TANKER.** *MAKE SURE ALL OTHER VALVES ARE CLOSED AND CAPPED!*
2. **OPEN VALVE ON TRANSPORT TANKER AND 3" VALVE #5 UNDER STORAGE TANK.**
3. **START PUMP ON DURATANK (REVERSE DIRECTION).**
4. **WATCH THE TANK LEVEL GAUGE ON THE STORAGE TANK TO PROTECT AGAINST OVERFILLING.**
5. **TURN OFF PUMP WHEN FILL IS COMPLETE**
6. **CLOSE VALVE ON TRANSPORT TANKER.**
7. **CLOSE 3" VALVE #5 UNDER STORAGE TANK.**
8. **DISCONNECT HOSE FROM TRANSPORT TANKER AND PLACE END IN APPROPRIATE CONTAINER TO CATCH EMULSION THAT IS IN THE HOSE.**
9. **PROCEED TO CLEAN OUT INSTRUCTIONS.**

OFFLOADING EMULSION WITH PUMP

1. **MAKE SURE ALL VALVES ARE OFF.**
2. **CONNECT LOADER HOSE TO QUICK DISCONNECT OF THE PUMP ON THE STORAGE TANK.**
3. **PLACE OPPOSITE END INTO TANK YOU ARE LOADING.**
4. **OPEN 3" VALVE #5 UNDER TANK.**
5. **TURN PUMP SWITCH TO FORWARD POSITION.**
6. **BEFORE RECEIVING TANK IS COMPLETELY FULL, TURN MOTOR SWITCH OFF.**
7. **TURN OFF 3" VALVE #5 UNDER TANK.**
8. **PLACE END OF LOADER HOSE IN WASTE CONTAINER AND PROCEED TO PUMP CLEAN OUT INSTRUCTIONS.**

DURATANK PUMP CLEAN OUT INSTRUCTIONS

1. **ATTACH 3" LOADER/UNLOADER HOSE TO QUICK DISCONNECT ON PUMP IF NOT ALREADY ATTACHED.**
2. ***IF USING A FLAMMABLE LIQUID FOR CLEANOUT SOLVENT, CHECK THE AREA FOR ALL SOURCES OF OPEN FLAME, LIT CIGERATTES, TORCHES OR LIGHTERS. . EXTINGUISH ALL SOURCES BEFORE PROCEEDING.***
3. **PLACE OPPOSITE END OF HOSE INTO DRUM OF SOLVENT.**
4. **PLACE 1" CLEANOUT HOSE INTO WASTE BUCKET OR DRUM.**
5. **OPEN THE 1" CLEANOUT VALVE #6 APPROXIMATELY ¼ TURN.**
6. **HOLD BOTH HOSES IN PLACE TO AVOID BEING SPLASHED.**
7. **WHILE HOLDING BOTH HOSES IN PLACE TURN THE PUMP SWITCH TO "REVERSE" MOMENTAIRLY. THIS WILL DRAW SOLVENT THROUGH THE HOSE AND PUMP OUT INTO WASTE BUCKET.**
8. **SHUT OFF PUMP.**
9. **DRAIN THE REMAINING SOLVENT FROM THE 3" HOSE INTO THE WASTE BUCKET.**
10. **RETURN HOSE TO STORAGE AND PLACE CAP ON PUMP DISCONNECT**
11. **TURN VALVE ON 1" CLEANOUT VALVE #6 OFF AND DRAIN HOSE.**
12. **RETURN HOSE TO STORAGE POSITION.**

DURATANK MAINTENANCE INSTRUCTIONS

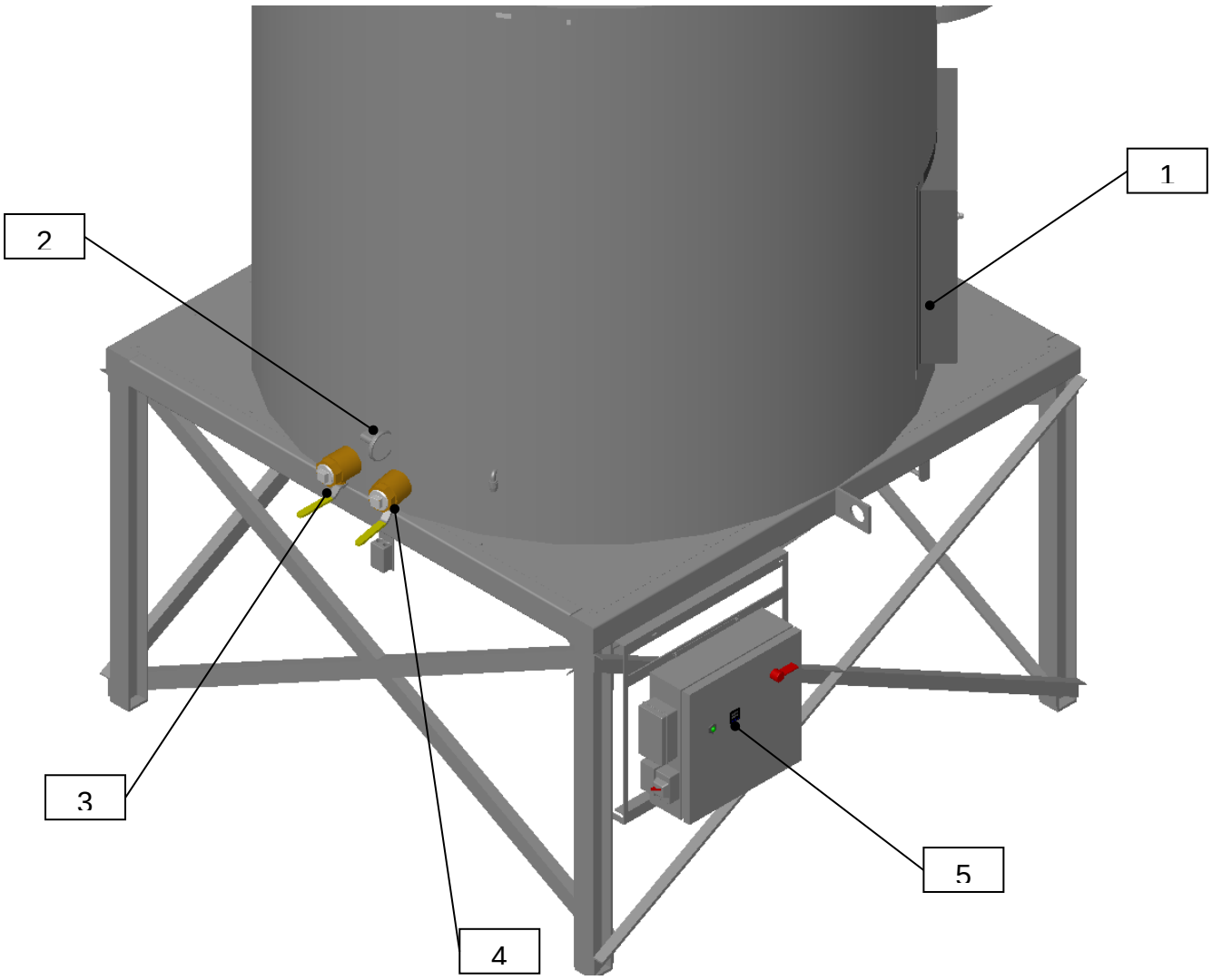
1. **Agitator motor and pulley assembly shaft.**
   Once a month, give 5 pumps of high temp grease in each grease zerk. All zerks are located together on ground level. Check on top of tank for grease on gear and shaft. Check belt tension and wear on agitator gears.

2. **Pump (if installed on tank) - Lubrication:**
   Bowie pumps require lubrication only where grease fittings are provided. **Attn: USE HIGH TEMP GREASE!** All bearing and bushing type pumps require a good grade of grease to insure longer life of the pumps. No lubrication is required on bushing or bearing type pumps if oil is pumped exclusively. This is the only exception. Periodic lubrication is of the utmost importance in care of the Bowie pumps. This point cannot be emphasized enough, and depending on use, this greasing should be done every 4 hours of continuous operation.

3. **Tank Clean Out.**
   Clean out the bottom of the tank at minimum every 2 years. Drain through bottom valve. Failure to do this can result in permanent damage to tank.

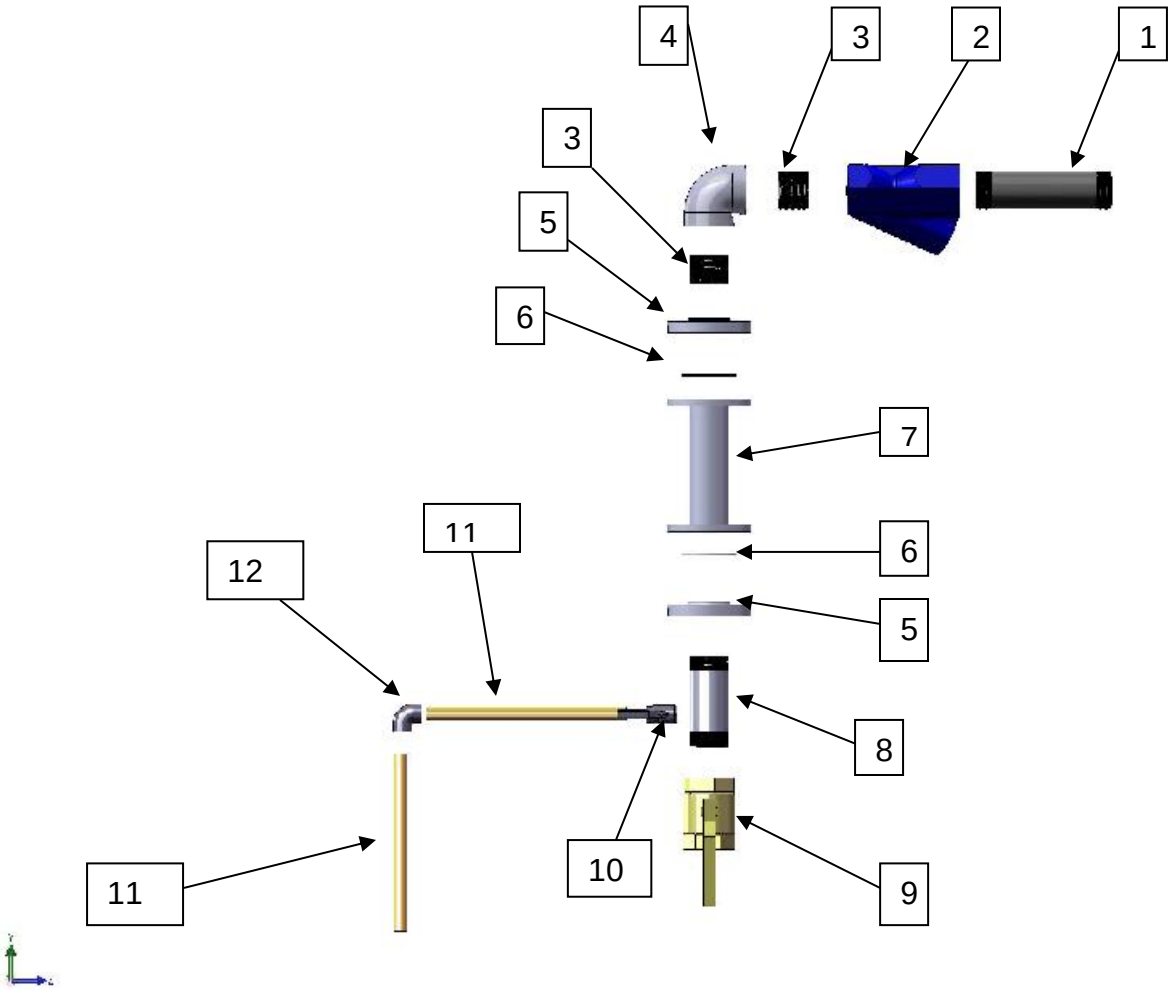
4. **Ladder and safety railing:**
   Inspect ladder and safety railing annually for rust or broken parts. Paint/repair as needed.

5. **Aluminum Cover:**
   Examine aluminum cover for damage and repair as needed.

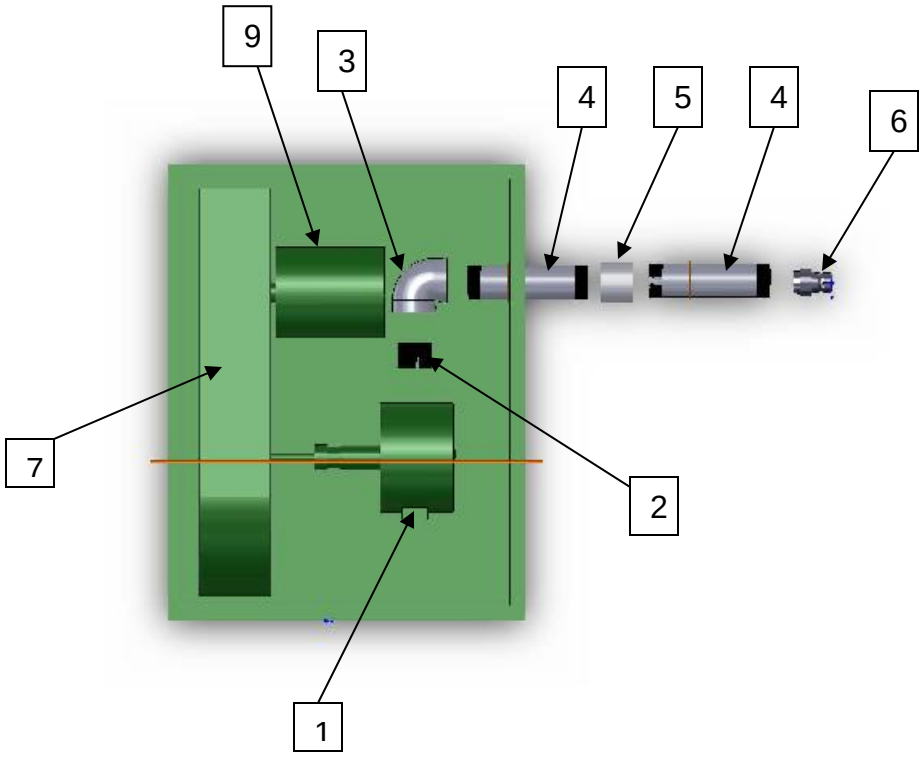


ITEM	PART NO.	DESCRIPTION
1	121079	MANHOLE COVER GASKET
2	130592	TEMPERATURE GAUGE
3	121070	3" BALL VALVE FOR VERTICAL STORAGE TANKS
4	408319	TANK BLEEDER ASSEMBLY
	130712	HEAT TAPE (NOT SHOWN)
	155585	REMOVABLE VALVE COVER CVR-1 (NOT SHOWN)
	155586	REMOVABLE VALVE COVER 10" X 8" LONG (NOT SHOWN)
	155587	REMOVABLE VALVE COVER 8" X 9" LONG (NOT SHOWN)
5	130728	CONTROL MODULE (NEW)
5	130729	CONTROL MODULE (REFURBISHED)

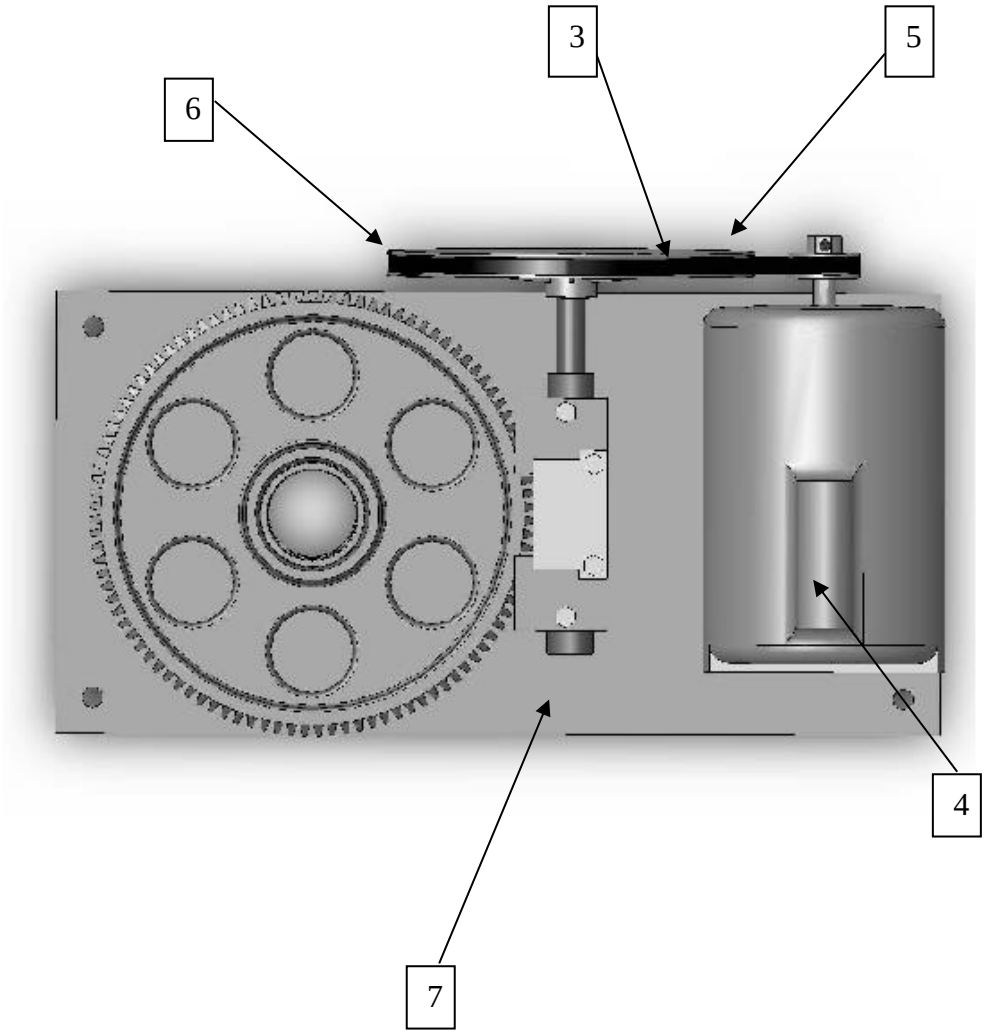
101160 TANK MAN HOLE GASKET HARDWARE KIT



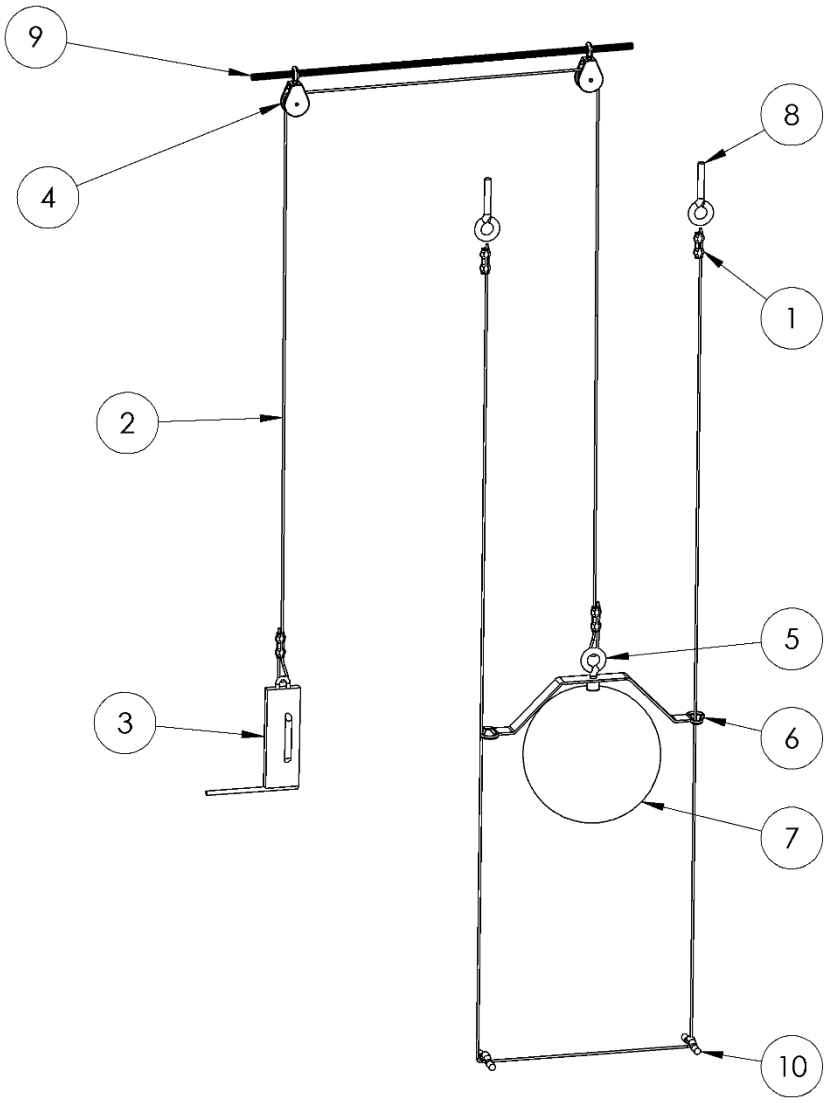
ITEM #	PART #	DESCRIPTION
1	121046	3” X 12” NIPPLE
2	121080	Y STRAINER
3	120924	3” CLOSE NIPPLE
4	120861	3” 90 DEG ELBOW
5	121075	FLANGE
6	121074	GASKET SET W/ BOLT
7	121073	FLEX COUPLING
8	408319	TANK BLEEDER
9	121070	3” BALL VALVE FOR TANKS
10	121059	1” BALL VALVE
11	121040	1” X 16” NIPPLE
12	121041	1” X 18” NIPPLE
13	130712	HEAT TAPE (PER FT)



ITEM #	PART #	DESCRIPTION
1	156168	BOWIE PUMP FOR 3 PHASE MOTOR
	156167	BOWIE PUMP FOR SINGLE PHASE MOTOR
2	120924	3” CLOSE NIPPLE
3	120861	3” 90 DEG ELBOW
4	121046	3” X 12” NIPPLE
5	427181	3” COUPLING
6	121032	3” MALE CAMLOCK
7	111750	PUMP BELT
8	130712	HEAT TAPE (PER FT)
9	130690	10 HP 3 PH BOWIE PUMP MOTOR ONLY
	156166	10 HP 1 PH BOWIE PUMP MOTOR ONLY



Item #	Part #	Description
3	111757	AGITATOR BELT
4	130705	ELECTRIC MOTOR 240V 1PH ¾ HP
4	130706	ELECTRIC MOTOR 240V/480V 3PH ¾ HP
4	130703	ELECTRIC MOTOR 240V 1PH 1 HP
4	130704	ELECTRIC MOTOR 240V/480V 3PH 1 HP
5	111754	AGITATOR MOTOR PULLEY
6	111753	10” PULLEY
7	111758	AGITATOR GEAR ASSEMBLY



ITEM NO.	PART NUMBER	DESCRIPTION
1	101099	TANK FLOAT CABLE CLAMP
2	500754	1/8" SS CABLE (BY FOOT)
3	407748	TANK INDICATOR FLAG
4	111761	TANK FLOAT PULLEY
5	101109	TANK FLOAT EYEBOLT
6	407747	FLOAT BRACKET ASSEMBLY
7	155600	STORAGE TANK FLOAT
8	101109	TANK FLOAT EYEBOLT
9	200570	PULLEY BRACKET ALLTHREAD
10	155554	INDICATOR LEVEL TIE DOWN

Manual Timer Instructions

INTERMATIC T1975 - 125 VOLT 60 HZ CLOCK MOTOR
INTERMATIC T1976 - 208-277 VOLT 60 HZ CLOCK MOTOR

PROGRAM TIME SWITCH WITH “SKIPPER”
FOR UP TO 48 TIMING OPERATIONS ON 24 HOUR SCHEDULE
SINGLE POLE DOUBLE THROW

SWITCH RATING: 20 AMP, 125-480 VOLTS A.C. ½ HP-125V 1HP-250V

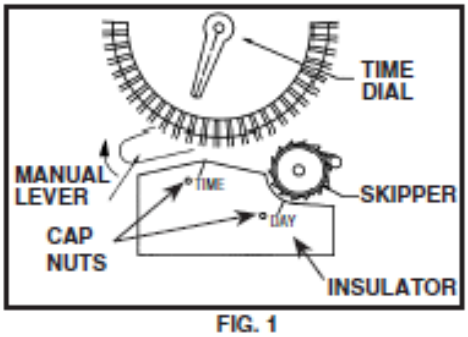
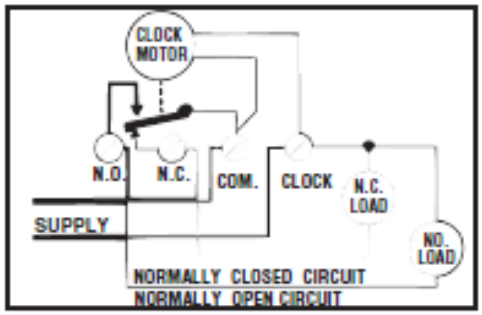


FIG. 1



WIRING DIAGRAM

WIRING INSTRUCTIONS
This Time Switch can be wired to control two circuits as Single Pole Double throw, or to control one circuit as Single Pole Single Throw. Either normally open (NO) or normally closed (NC). To wire switch see wiring diagram above.

PROGRAMMING INSTRUCTIONS

1. **TO PROGRAM TIME SWITCH,** Depress tripper(s) into dial at desired time(s) operation(s) is/are required.
   • **ON TIME:** First tripper turns on the load for 16-20 minutes. Each additional tripper will lengthen the on time by 15 minutes. If skipping of selected days is desired, the skipper tripper (silver color) should be used to initiate the first operation of the daily program, provided that there is at least 3 hours between the last operation of the previous day and the first operation of the present day.
   • **OFF TIME:** First tripper in raised position turns off the load for 10-14 minutes. Each additional space will lengthen the off time by 15 minutes.
2. **SET TIME-OF-DAY:** Turn dial in clockwise direction only and align the exact time-of-day (the time now when switch is being put into operation) to the “TIME” arrow on insulator.
3. **CHECK SKIPPER WHEEL** If switch is to function seven days a week, pull all pins, in skipper wheel up to “OUT” position. Otherwise depress pin(s) in skipper wheel for day(s) automatic operation is not required.
   • If, after the dial is set to the correct time of day, and the skipper tripper (silver color) has not yet passed the skipper wheel, turn wheel counter clockwise so that the previous day is opposite the “DAY” arrow.
   • If the skipper tripper has already passed the skipper wheel, set the correct day opposite the “DAY” arrow.

OPERATING INSTRUCTIONS
TO CONTROL LOADS MANUALLY, Move manual lever (See Figure 1) up. This lever will close normally open circuit and open the normally closed circuit. To return, to automatic control, move lever back to its original position .
IN CASE OF POWER FAILURE, reset dial. See step (2) of programming instructions.
TO REMOVE MECHANISM FROM CASE, Disconnect electricity and all wiring. Depress retainer spring at upper left, then grasp dial and pull mechanism out.

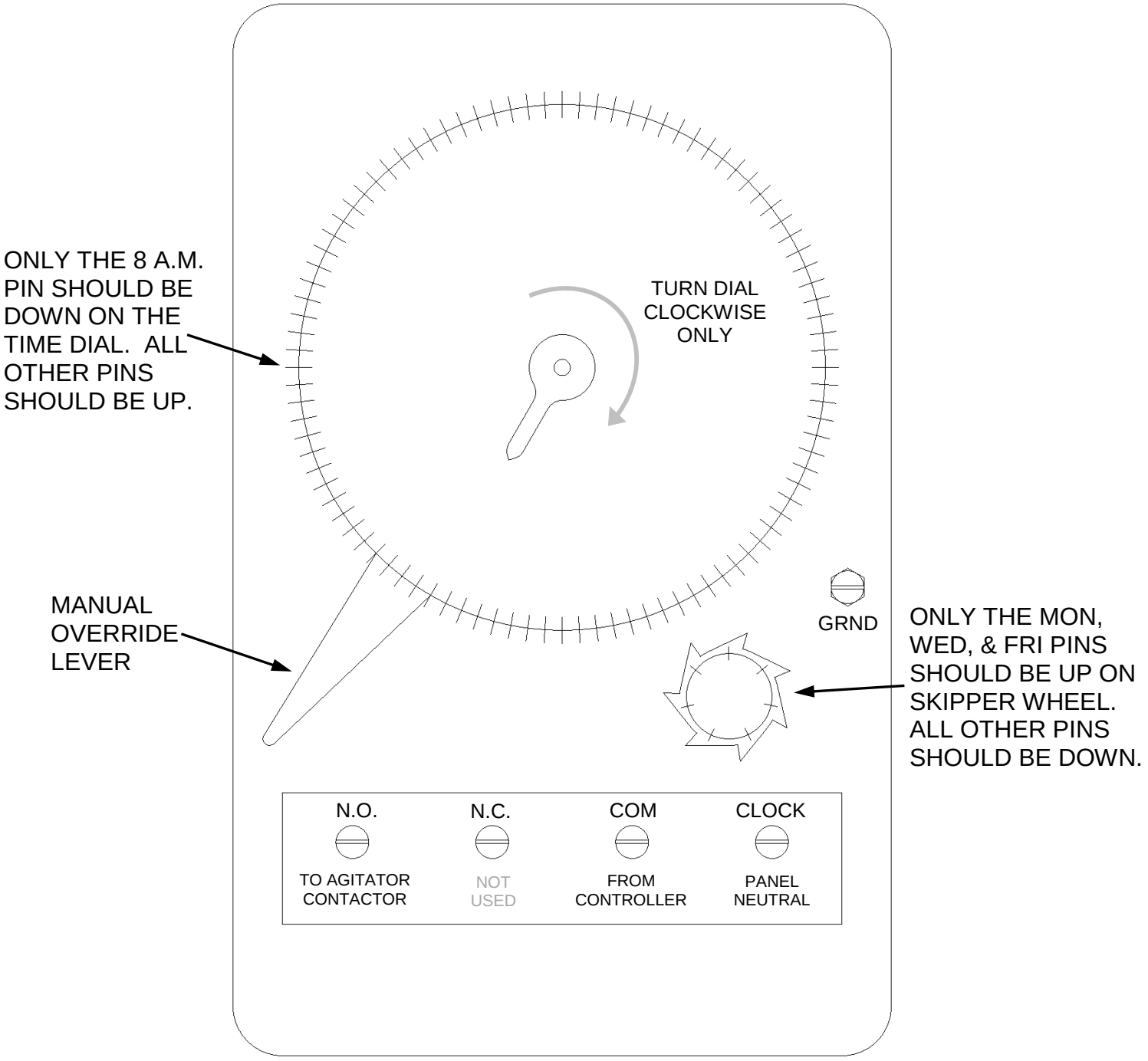
INTERMATIC INCORPORATED
SPRING GROVE, ILLINOIS 60081-9698

NOTE Manual lever will only override Time Dial. It will not override Skipper. It may be necessary to manually rotate Skipper before using manual lever to turn agitator on.

MANUAL TIMER SETTING

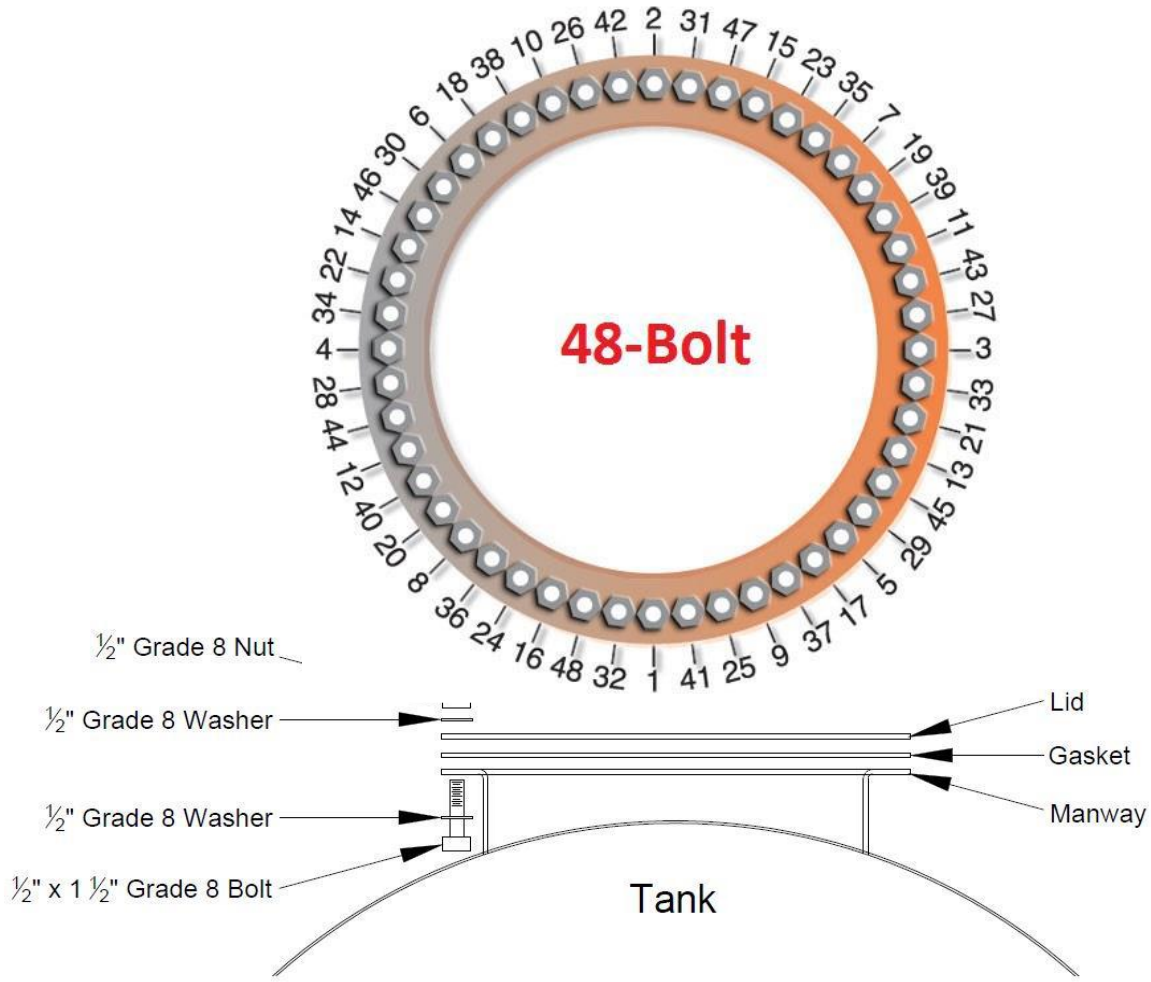
The timer is set from the factory to come on three times per week for fifteen minutes each time. This is usually Monday, Wednesday, and Friday at 8 A.M. Times may vary if the clock does not have continuous power.

Setting the timer to run the agitator excessively can lead to reduced life of the agitator gear assembly and reduced life of the emulsion.



Newberry Tanks & Equipment, LLC

Manway Tightening Procedure



- **Mark the numbers on the lid to help tracking the tightening process.**
- **First time around just snug the nuts with a hand wrench.**
- **Second time around tighten the nuts firmly with the same wrench.**
- **Third time around apply approximately 27 ft lbs of torque.**
- **Fourth time apply approximately 80 ft lbs of torque.**
- **Fifth time around, apply 107 ft lbs of torque.**
- **Sixth time around, apply 135 ft lbs of torque.**
- **If possible, re-torque at 135 ft lbs after 24 hours. Most of any bolt preload loss occurs within the first 24 hours.**

48 Hole Man Hole Gasket – Part # 121079
Tank Man Hole Gasket Hardware Kit – Part # 101160

Duraco recommends replacing all hardware when installing a new gasket

Asphalt Emulsion Information

Asphalt emulsions are classified into-three categories: anionic, cationic, and nonionic. In practice, the first two types are more widely used in roadway construction and maintenance. Nonionics may become more important as emulsion technology advances. The anionic and cationic classes refer to the electrical charges surrounding the asphalt particles. This identification system stems from a basic law of electricity -like charges repel one another and unlike charges attract.

When two poles (an anode and a cathode) are immersed in a liquid and an electric current is passed through, the anode becomes positively charged and the cathode becomes negatively charged. If a current is passed through an emulsion containing negatively charged particles of asphalt, they will migrate to the anode. Hence, the emulsion is referred to as anionic. Conversely, positively charged asphalt particles will move to the cathode and the emulsion is known as cationic. With nonionic emulsions, the asphalt particles are neutral and do not migrate to either pole.

Emulsions are further classified on the basis of how quickly the asphalt droplets will coalesce; (i.e., revert to asphalt cement). The terms RS, MS, SS and QS have been adopted to simplify and standardize this classification They are relative terms only and mean rapid-setting, medium-setting, slow-setting and quick-setting. The tendency to coalesce is closely related to the speed with which an emulsion will become unstable and break after contacting the· surface of an aggregate. An RS emulsion has little or no ability to mix with an aggregate, an NIS emulsion is expected to mix with coarse but not fine aggregate, and SS and QS emulsions are designed to mix with fine aggregate, with the QS expected to break more quickly than the SS.

Emulsions are further identified by a series of numbers and letters related to viscosity of the emulsions and harness of the base asphalt cements. The letter "C" in front of the emulsion type denotes cationic. The absence of the "C" denotes-anionic in American Society for Testing and Materials (ASTM) and American Association of State Highway and Transportation Officials (AASHTO) specification. For example, RS-1 is anionic and CRS-1 is cationic.

The numbers in the classification indicate the relative viscosity of the emulsion. For example, an MS-2 is more viscous than an MS-1. The "h" that follows certain grades simply means that harder base asphalt is used. An "s" means that softer base asphalt is used.

The "HF" preceding some of the anionic grades indicates high-float, as measured by the float test. High-float emulsions have a gel quality, imparted by the addition of certain chemicals that permits a thicker asphalt film on the aggregate particles and prevents drain off of asphalt from the aggregate. These grades are used primarily for cold and hot plants mixes, seal coats and road mixes.

ASTM and AASHTO have developed standard specifications for these grades of emulsion:

Asphalt Emulsion (ASTM D977, AASHTO M140)	**Cationic Asphalt Emulsion** (ASTM D2397, AASHTO M208)
RS-1	CRS-1
RS-2	CRS-1
HFRS-2	-
MS-1	-
MS-2	CMS-2
MS-2h	CMS-2h
HFMS-1	-
HFMS-2	-
HFMS-2h	-
HFMS-2s	-
SS-1	CSS-1
SS-1h	CSS-1h

Most producers may not stock all grades of emulsion. As well, many states have their own specifications that do not follow ASTM or AASHTO guidelines for naming emulsions. Communication and planning between user and producer helps facilitate service and supply of a given grade.

Quick setting emulsions have been developed for slurry seals. Cationic quick set (CQS) emulsions are widely used for their versatility with a wide range of aggregates and rapid setting characteristics. Several states use CQS and QS emulsion specifications for slurry seal applications. These specifications are similar to ASTM and AASHTO CSS-lh and SS-lh requirements except that the cement mixing requirement is waived.

Micro-surfacing uses an emulsion often referred to as CSS-lh-p. As with quick set emulsions, micro-surfacing emulsions are required to meet ASTM and AASHTO CSS-lh requirements with the exception of the cement mixing test In addition, a minimum polymer content normally is specified as 3% of solids based on the weight of the asphalt in the emulsion. This addition enhances the high temperature performance of the asphalt and permits application of micro-surfacing in wheel ruts and other areas where multiple stone depths are required.

The expanding use of polymer modified asphalts has contributed a whole new family of emulsion grades. Adding one letter (usually P, S or L) to the end of the grade (e.g., HFRS-2P) normally designates modified emulsions.

Cationic emulsion specifications (ASTM D 2397, AASHTO M 208) permit solvent in some grades but restrict the amount. Some user agencies specify an additional cationic sand-mixing grade designated CMS-2s that contains more solvent than other cationic grades.

STORAGE TEMPERATURES FOR ASPHALT EMULSIONS

GRADE	**TEMPERATURE,** °0C (°0F)	
	MINIMUM	MAXIMUM
RS-1	20° (70°)	60° (140°)
RS-2, CRS-1, CRS-2, HFRS-2	50° (125°)	85° (185°)
SS-1, SS-1h, CSS-1, CSS-1h, MS-1, HFMS-1	10° (50°)	60° (140°)
CMS-2, CMS-2h, MS-2, MS-2h, HFMS-2, HFMS-2h, HFMS-2s	50° (125°)	85° (185°)

RAPID-SETTING EMULSIONS

The rapid-setting grades are designed to react quickly with aggregate and revert from the emulsion to the asphalt. They are used primarily for spray applications, such as aggregate (chip) seals, sand seals, and surface treatments. The RS-2, HFRS-2 and CRS-2 grades have high viscosity to prevent runoff. Polymer modified versions of these emulsions are routinely used where rapid adhesion is necessary; such as in high traffic areas, when there is minimal traffic control, or where there is heavy truck traffic.

MEDIUM-SETTING EMULSIONS

Medium-setting grades are designed for mixing with graded aggregate. Because these grades are formulated not to break immediately upon· contact with aggregate, they can coat a wide variety of graded aggregates. Mixes using medium setting emulsions can remain workable from a few minutes to several months depending upon the formulation. Mixes are produced in pugmills and travel plants or can be road mixed. In recent years, they have been used in cold recycling applications.

Examples of medium-setting emulsions are MS-2, CMS-2 and HFMS-2. Nomenclature for medium-setting emulsions varies from state to state. Consultation with your local emulsion manufacturer is suggested for recommendations.

High-float is a special class of anionic MS emulsion. The major difference between these emulsions and the conventional medium-setting is the existence of a gel structure in the asphalt residue that is measured by the float test. The float characteristic increases film thickness. While regular asphalt may have a tendency to flow or migrate, the high-float residues are designed to stay in place up to 70°C (160°F). Therefore, high-float residues are less susceptible to changes in temperature and very resistant to flow at high temperatures during the summer.

Polymer modified versions of medium-setting emulsions may be used where additional stability or improved durability is needed to where improved water resistance is important.

SPRAY INJECTION PROCESS REPAIR OF POTHOLES

The methods typically used for the repair of potholes using asphalt emulsions are throw and-roll, semi-permanent and full-depth removal and replacement. All of these methods involve placing cold mix in the pothole with a shovel and compacting with a truck tire, vibratory plate compactor or steel-wheeled roller. Maintenance mixes for these repair methods and other patching are covered in Chapter 9 Asphalt Pavement Recycling of this manual. For information on pavement repair procedures, refer to Asphalt in Pavement Maintenance, Manual Series No. 16 (MS016), asphalt Institute.

Another method for repairing potholes is by spray-injection. A special piece of equipment, either trailer or truck-mounted, combines together and blows asphalt emulsion and coarse crushed aggregate into the pothole. The spray-injection procedure consists of these steps:

- Blowing or water and debris from the pothole.
- Spraying a tack coat of asphalt emulsion on the sides and bottom of the pothole.
- Blowing of emulsion and aggregate into the pothole.
- Covering the repaired area with a thin layer of aggregate.
- Opening the repair to traffic as soon as workers and equipment are clear. This method of repair requires no, compacting after the cover aggregate has been placed.

Experience has shown that the asphalt emulsion to use for spray injection varies between summer and winter application. Summer application, for temperature above 1 0°C (50°F), works best with CRS-2, RS-2 or HFRS-2 grades. Limiting the penetration of the residue to a maximum of 135 within the range allowed in the emulsion specification has also shown beneficial in the performance of spray injected patches placed in warm weather.

Winter applications [colder than l0°C (50°F)] call for a CMS-2, MS-2 or HFMS-2 emulsion. Requiring the penetration of the residue to be a minimum of 135 within the range allowed in the emulsion specification has also shown beneficial in the performance of spray-injected patches placed in cool weather.

For good aggregate coating under either temperature condition, experience has shown the emulsion temperature should be about 65°C (150°F), and the emulsion's Saybolt Furol viscosity at *50°C* (122°F) should be limited to 250 seconds.

Aggregate sizes that work best for spray injection are AASHTO or ASTM size No. 9 [4-75 to 1. 18 mm (No. 4 to No. 16)] with no more than 3 percent passing the 75 um (No. 200) sieve. Crushed aggregate material is recommended for spray injection. Using the emulsions described above, an asphalt emulsion content of approximately seven percent by weight of aggregate works best for warm weather conditions, while spray injection patched placed in winter conditions perform well at an asphalt emulsion content of about five percent by weight of aggregate.

SOURCE: Asphalt Institute, A Basic Asphalt Emulsion Manual No. 19

Handling Asphalt Emulsions

DON'T use tight clearance pumps; they may seize

DON'T leave emulsion in pumps, valves, or lines during freezing weather.

DON'T hold emulsions in lines and pumps for extended periods.

DON'T apply severe heat to pump casings or packing glands. The pump may be damaged and the emulsion may break.

DON'T store emulsions in horizontal tanks.

DON'T circulate emulsions excessively. Emulsions tend to loose viscosity when pumped.

DON'T dilute rapid-setting emulsions with water. Never add emulsion to water.

DON'T dilute emulsions with unpotable or cold water.

DON'T pump emulsions into open air or have inlet lines near top of tank.

DON'T place outlet lines in mid tank.

DON'T mix emulsions of different chemical types or designations. Anionic and cationic emulsions may coagulate when mixed.

DON'T subject emulsion or the air above it to open flame or strong oxidants. Never heat the emulsion over 190°F (88°C).

DON'T **proceed if you have questions.**

DO set the clearance on pumps for emulsions to prevent binding and to prevent breaking of the emulsion.

DO clear lines, valves, and pumps of emulsion. Drain pumps and remove plugs during freezing weather.

DO drain pumps and remove plugs when not in service. No. 1 or No. 2 fuel oil may be used to keep pumps free.

DO warm the pump casings and packing glands to about 150°F (65°C) to ease start up.

DO store emulsions in vertical tanks to prevent excessive skin formation

DO gently circulate emulsions when heating or after prolonged storage.

DO dilute medium and slow-setting emulsions by adding warm water to the emulsion.

DO check compatibility of water and emulsions in a flask prior to use on larger volume.

DO place inlet and return lines near the bottom of the tank to prevent foaming.

DO pump emulsions from the bottom of the tank to reduce skin formation.

DO drain tanks to no measureable quantity before adding an emulsion of different type. Emulsions with the same designation may be very different in performance.

DO provide adequate ventilation. Heat only to reasonable temperatures.

DO **consult your AEMA Member Company for additional emulsion information.**

TX DOT FILTER AND BELT IDENTIFICATION FORM

FILTERS

FILTER TYPE (Air, Oil, Hydraulic)	LOCATION (Engine, Trans.)	EQUIPMENT (Manufacturer's Part No.)	FILTER (Manufacturer's Name)	FILTER (Manufacturer's Part No.)
N/A	N/A	N/A	N/A	N/A

BELTS

BELTS TYPE (Alt., Power Steering)	EQUIPMENT (Manufacturer's Part No.)	BELT (Manufacturer's Name)	BELT (Manufacturer's Part No.)
AGITATOR	4L-360	DURAFLEX GL	4L-360
PUMP MOTOR	R3VX560	THERMOID	3VX560

DURATANK WARRANTY

Duraco, Inc. warrants its DuraTank to be free from defects in material and workmanship for a period of one (1) year from the date of original purchase. The warranty is in lieu of all other warranties expressed or implied.

This warranty does not apply to any part of the goods which has been subjected to improper or abnormal use, negligence, alterations, accident, or damage due to lack of maintenance.

Duraco, Inc. will replace for the Purchaser any part or parts found upon examination to be defective under normal use and service due to defects in material or workmanship.