Fac ID# 463141
Doc# 2304375

KROFTA MULTIFLOAT DAF

OPERATION MANUAL

2/10/2016

MULTIFLOAT (MF) GENERAL DESCRIPTION

The Krofta Technologies Corporation MULTIFLOAT (MF) is a rectangular dissolved air flotation (DAF) unit (vertical or horizontal arrangement available) engineered to be installed in a wide variety of industrial or municipal applications. The design is of a modular configuration, which allows additional Flotation Enhancement Cells (FECs) to be added or subtracted from the flotation cell to accommodate different flow capacities.

PROCESS DESCRIPTION

A mix of raw wastewater and aerated recycle flow are introduced at the bottom side of the unit. A header pipe is affixed to the outside of the unit that will distribute the flow to the individual FECs within the flotation tank. This arrangement also allows the unit to be customized so that the unit can be installed tight against a wall on either side of a room by swapping the influent / effluent piping to either side of the unit. FEC design allows for even distribution of the flow across the unit. Retention time within the unit will vary with the amount of raw water being processed but it is generally a minimum of 3-4 minutes. Flocculated particles attach to the aerated water and rise to the surface close to the plate inside the FEC. The plates assist in the rise rate by reducing the hydraulic head over the particle allowing it to rise at an increased rate. Clarified water is drawn back down between the FECs to a collection area below the bottom of the FECs. The clarified water flows up over a divider plate at the top of the tank, into a clearwell reservoir and is then discharged by gravity out of the unit. The Krofta automatic level control system maintains a constant water level.

A portion of the flow is “recycled” back to the Air Dissolving Tube (ADT) through a separate connection below the effluent line. Should flow be shut-off to the unit, this ensures the flow to the recycle pump will not stop and cause damage to the pump. Floated materials are collected at the top of the FECs and directed towards the sludge collection rake assembly. The rake pushes the floated material over a simple beach design and deposits the material into a small sludge collection trough that is discharged by gravity.

Grit or other debris that does not float is collected in the v-bottom of the unit. Because of the small footprint of the unit, a scraping mechanism is not required. The bottom sediment sump is intermittently purged automatically. One or more (depending on the size of the unit) butterfly valves for the purge are controlled by a simple timing mechanism in the control panel or PLC.

AIR DISSOLVING SYSTEM: A portion of the clarified water (typically 15% - 30% depending on the application) is recycled to feed the air dissolving system. The water is drawn from the clarified water source and pumped through a standard centrifugal pump at ~180 ft/hd. The clarified water then enters the ADT where it has an 8-12 second retention time. A globe valve located on the discharge line controls the flow. The pressurized flow is connected to the inlet header where it is mixed with raw water flow prior to entering the unit. A specially designed influent nozzle causes the flow from the recycle pump to enter the ADT in a spiral pattern.

MULTIFLOAT UNIT DESCRIPTION

TANK COMPONENTS

MULTIFLOAT tank parts are standard in stainless steel. Customer pipe connections are at flanges located under the unit. A sump well in the tank floor is provided to collect sediment. Sediment is released through a purge valve located at the bottom of the sump well. A window located on the tank wall is provided for visual verification of floated sludge thickness and proper flotation of solids.

AIR DISSOLVING SYSTEM

The **KROFTA** Air Dissolving System aerates and pressurizes the flow required to provide flotation. The Air Dissolving System consists of the Air Dissolving Tube (ADT), an air meter, pressure gauges, a sample valve, a pressure release valve, and an ADT flow pump.

The ADT is standard in stainless steel and is designed to dissolve air into a pressurized water flow. The ADT requires minimum flows and pressures in order to function properly. Excess air and water is removed through the bleed off located at the centerline of the tube. A pressure gauge is provided with connections to the inlet piping of the ADT and to the ADT itself. Isolation valves allow for a pressure differential between the inlet and the tube to be determined. The pressure gauge at the outlet monitors the system pressure when the pressure release valve is adjusted.

LEVEL CONTROL

The water level in the MULTIFLOAT unit is kept constant with the use of an automatic level control system. The automatic level control system consists of a flange mounted transmitter located on the outer tank wall, a control unit to process the transmitter signal, and an actuated butterfly valve located on the effluent line. The actuated butterfly valve opens or closes in order to maintain a constant water level, required to hold a constant level with a changing feed flow rate.

AIR DISSOLVING TUBE DESCRIPTION

The KROFTA TECHNOLOGIES CORPORATION Air Dissolving Tube (ADT) has been in use on Dissolved Air Flotation (DAF) clarifiers since the 1970s. Since that time, over 2000 ADTs have been put into operation producing dissolved air in a recycle stream on a wide variety of applications and types of equipment. These pressure vessels often have 1 to 1 ½ minutes of retention time and operate at anywhere from 70 to 150 psi or more. This retention time is 6 to 9 times longer than that required by the ADT.

The typical pressure vessel design has an upper zone containing air in which pressurized water is introduced and sprayed across or mixed in. The air is dissolved into the water in this zone. The water then falls to the bottom of the vessel. The lower zone of the vessel is filled with water and has the purpose of eliminating entrainment of any undissolved air in the discharged water. Entrainment of air in a recycle stream will cause air hammer effects, coarse air bubbles, and turbulence in the flotation clarifier, which will result in decreased efficiency. This type of pressure vessel will require an ASME code and should be tested annually for safety purposes.

The ADT eliminates the need for large volumes of air and water by using air dispersion technology and centrifugal force in place of sheer volume and gravity. Compressed air is pumped into the ADT across the surface of an air panel. The material that this panel is made from disperses the air across the entire surface of the panel. This allows for faster dissolution of air into the water and hence retention time of only 7-12 seconds. The flow pattern is a cyclone or vortex, which produces a centrifugal force that helps to eliminate the undesirable entrained air. A specially designed inlet nozzle is sized specifically for each application and can be easily changed out if the recycle requirements of future waste streams change dramatically. In addition, a “bleed-off” outlet also assists in eliminating too much air in the tube itself. This ensures that the tube will never air bind or create a plug flow around the air panel.

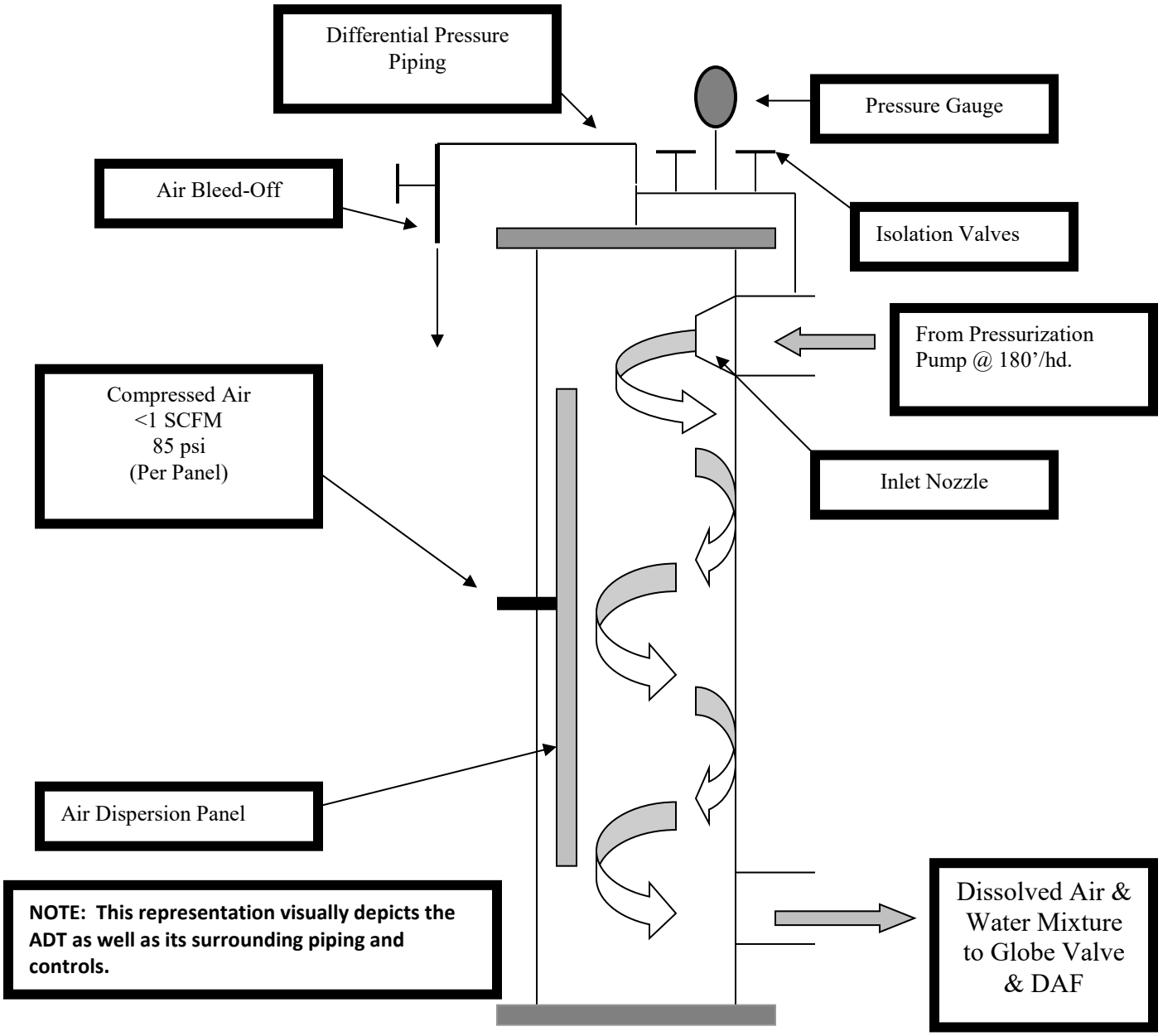
The ADT contains one or more Air Panel Assemblies that disperse the compressed air from the compressor across the surface of a vyon panel. Water from the centrifugal pressure pump is pumped through the ADT at ~180’/hd. A specially designed nozzle directs the flow in a tangential flow pattern so that it encircles the air panel assembly within the tube. As the water enters the ADT, it interfaces with the vyon panel. Since air pressure is higher than water pressure, the air is dissolved into the recycle stream. Each panel assembly has a stainless steel backing assembly and front cover plate. Small holes are cut in the front cover plate exposing surface area of the vyon panel to the spiraling water flow.

Some of the many advantages of the ADT are as follows:

- Small Size: The ADT is 6-9 times smaller than traditional style pressure vessels. This reduces footprint requirements and increase mounting possibilities. The ADT can be installed horizontally or vertically and can be easily retrofitted to any style DAF clarifier.
- Elimination of any entrained air from the outlet by centrifugal separation and “bleed-off” capability.
- Simple construction using standard piping components. Units can be fabricated in either 304 or 316 SS.
- Stainless Steel offers superior corrosion resistance over mild steel. It also offers a superior appearance and reduces maintenance since it does not need to be painted.
- The inherently safe design with standard piping components and a moderate operating pressure (65-85 psi) eliminates the need for an ASME certification.
- A customized inlet nozzle designed to meet specific flow requirements that can be easily removed and changed should the requirements change significantly. Adding 1 or more additional ADTs accommodate applications requiring large flows.
- Simple Operation: The ADT requires minimal supervision and attention once it is brought on line. There are no moving parts within the ADT. The ADT also utilizes a standard pump.
- Low Air Consumption: The ADT consumes less than 1 SCFM/500 liters (132 gallons) of ADT capacity.

- Maximized Flotation: When the ADT is matched with a properly sized globe valve for pressure release, the ADT will produce a 30-70 micron air bubble, which is well suited for dissolved air flotation.
- Installation versatility: The ADT can be provided on a wide variety of platforms. In addition to the standard tube, options can be selected which have the ADT mounted on a skid or stand, pre-piped and or wired to a pump or control system.
- 7 Models to choose from with capacities from <80 gpm to 800 gpm

Air Dissolving Tube



OPERATIONAL PARAMETERS

Air Dissolving Tube/System

Air Pressure- Air Pressure should always be higher than the inlet recycle pump pressure. Generally, the recycle pump runs in the 70-80 psi range. Air pressure must be a minimum of 80 psi or 5-10 psi higher than the pump pressure to ensure it can overcome the internal tube pressure and is injected into the recycle stream. Instrument air is not necessary; however remember to purge the regulator water trap regularly if not equipped with an automatic purge. There is a Safety Valve on the pneumatic control panel, which is preset at 100 psi to prevent over-pressurization of the tube.

Air Volume – There is a Rotometer for each air dissolving tube panel. The meter should be set for a *maximum* of 30 SCFH or <1 SCFM per air panel. Best results may be obtained at ~20 SCFH per rotometer. There should be no water visible within the rotometer. If water is present, it likely indicates the check valve has failed at the ADT injection point. Replace both the rotometer and check valve if necessary.

Air Solenoid & Pressure Switch – On some installations, there may be an automatic solenoid that opens upon initiation of a Start sequence. The air solenoid may have a slight delay from the actual pump start to enable the pump to start freely, reducing the chances of air binding or pump cavitations. If the system has a Pressure Switch as well, the system may not start in "Auto" mode when the proper air pressure is not present.

Recycle Pump – The recycle pump should be a standard centrifugal design. Pump requirements are generally 20-25% (or more depending on type of application) of the process flow and are designed at a minimum of 180'/HD (~78 psi). The suction of the pump should always be flooded for proper operation and quick re-starts. Pressure at the ADT inlet should be in the ~75-80-psi range. This pressure is controlled by the globe valve.

Air Dissolving Tube (ADT) – The ADT can be mounted vertically or horizontally. Inlet and outlet pressure can be determined by closing the Bleed-Off valve and alternately closing and opening the two remaining ball valves. One reading is the inlet (pump pressure); the second reading is the pressure at the center of the tube (after the inlet nozzle). Almost all Krofta style units were designed for use at an 8-10-psi minimum pressure differential between these two readings. **The differential will correspond to 20-25% of the design influent flow rate.** A curve is generally supplied with each system that details flow rates at each differential reading. Larger pressure drops will provide more aerated water to the clarifier and vice versa. The Globe Valve(s) controls this volume (see Pressure Release below). Do NOT run the system at less than 60 psi (center of tube pressure) because dissolving efficiency will be diminished and system performance will drop. Too much recycle flow can add excessive turbulence within the DAF. This may be as detrimental and cause poor flotation in the DAF as not enough recycle flow to float the solids load in the DAF. Avoid large pressure drops (>12 psi) as excessive turbulence will likely result. You will also reduce the contact time for the air and water in the dissolving tube reducing efficiency. You will pump more water but there will be less air in each gallon entering the DAF.

Bleed-Off Valve – The ADT requires that a Bleed-Off Valve be open approximately 1/3 during normal operation. The Bleed-Off valve ensures that air pocket are not formed in the tube causing air binding, coarse air, or plug flow around the air dissolving tube panel. There should be an air/water mixture exiting the tube at all times. This is normally piped to a floor drain, clear well, sludge well, or back into the raw water stream.

Pressure Release – Pressure is released at the Globe Valve and mixed with the influent water in the pipe on Single Rotary Joint models. Pressure is released at the Globes Valves and mixed in the tank on double rotary joint models. On Single Rotary Joint models, the Globe Valve should be 1'-3' from the bottom of the unit. It may be necessary on some systems to intermittently purge the Globe Valve(s) to maintain the optimum pressure differential on the ADT. On SAF-BP models, two or more Globe Valves are located in the Flocculator and distribute the pressurized stream from the ADT into an aerated water ring. These valves are controlled by handles mounted on the outside of the tank. Some systems may be equipped with auto-purging models.

*** Note – Never inject polymer or other coagulation/flocculation chemicals into the ADT. In general terms, it is recommended that the coagulant be injected as far away as possible (with as much contact or mixing as possible) and that the polymer (flocculent) be injected after the globe valve. This will help to eliminate floc shear due to the turbulence in the pipe**

INITIAL START-UP PROCEDURES

Prior to starting up the DAF System for the first time a thorough inspection must be conducted by the customer to ensure that no construction debris, pipe shavings, or other foreign material or contaminants which could interfere with the proper operation of DAF System components and ancillary equipment including but not limited to valves, check valves, and pumps is present in the system.

If a chemical metering system is being commissioned for the first time, the fully installed chemical metering system must be pressure and leak tested using clean water before priming and charging the chemical metering system with the chemical to be used. Commissioning, maintenance, and operation of the chemical feed pumps should be attempted only by qualified and properly trained personnel using all necessary personal protective equipment (PPE) recommended for protection from a chemical, which includes eyewear and chemical specific PPE. A copy of the MSDS for each chemical handled should be reviewed and thoroughly understood prior to working on any chemical feed system utilized for a specific chemical. Appropriate Personal Protection Equipment (PPE), which may include goggles; face shield; and rubberized coat, pants, and gloves must be used when working with chemicals or the chemical storage and metering equipment. When performing maintenance on any chemical system, great care must be taken to prevent accidental contact to the chemicals by those persons performing the maintenance task and any other personnel in the area. Contact with chemicals associated with DAF operations has the potential for severe injury to unprotected personnel.

1. Close all drain, sampling, purge and air inlet valves to the MULTIFLOAT and Air Dissolving System.

2. Set the Scraper speed setpoint to 25% (15Hz), which is the minimum allowed Scraper gearmotor speed to ensure adequate cooling of the motor.

   Start the drive for the Scraper and verify that the Scraper is traveling in the correct direction; the Scraper blades traveling on the underside flight of the Scraper assembly should be traveling toward

the Sludge Hopper and the Scraper blades traveling on the upper flight of the Scraper assembly should be traveling away from the Sludge Hopper.

Observe the Scraper travel for several complete chain rotations and verify that there is no mechanical binding or other abnormal movement.
NOTE: It is common for the Scraper chains to stretch during the initial period of operation, typically on the order of 30 days depending on the duty cycle of the Scraper. After an ititial period of operation a chain link may need to be removed from both chains to rectify excessive play in the Scraper assembly due to the chains stretching. For the chain adjustment procedure, refer to MAINTENANCE & TROUBLESHOOTING – MECHANICAL MAINTENANCE – SCRAPER.

3. Check the level control mechanism. Turn on the raw water feed pump or open the inlet valve if the clarifier is gravity fed. Allow the water level to stabilize.

4. Start-Up the Air Dissolving System

   a) Start Recycle Pressure Pump (ADT Pump).

   b) Open the ADT Pressure Release Valve (Globe Valve) to provide a pressure drop across the ADT inlet corresponding to the recycle flow required by your process (Refer to ADT Flow Curve). This pressure drop pressure drop is calculated by subtracting the pressure in the ADT from the inlet pressure to the ADT. Use the differential pressure isolation valves to obtain these two pressures. Typically, the required pressure drop is 8 PSI.

   c) Adjust the Air Filter Regulator to 90 PSIG. Note that the air pressure must always be higher than water pressure to prevent backing of water into the air- lines.

   d) Open the Air Supply Isolation Valve(s) to the ADT Air Panel(s). Note: that the air supply should be off whenever the pressure pump is not operating.

   e) Set the Air Flow Meter to 10-30 SCFH. This may need to be increased due to application or over time as Air Panel Insert becomes fouled.

   f) Open the air bleed off valve slightly to allow any excess air to escape. Generally, 1-3 GPM of water also exists the tube, insuring a buildup of excess air cannot occur in the tube. A clear piece of plastic is used to allow a visual check of the flow.

5. Start the chemical pumps.

6. The water level in the MULTIFLOAT should be adjusted for optimum floated sludge collection by the rake. Typically, a 4” to 6” sludge blanket with the rake operating at 50% of the variable frequency output is the optimum condition. Lowering the water level reduces sludge collection, allowing a thicker, dryer layer of sludge to form on the surface. Raising the level increases collection and thins out the sludge layer. It will take up to an hour after a level change before the sludge thickness reaches equilibrium. The sludge layer becomes too thick when it begins to break up in pieces and/or settle out. Adjustment of the speed is important for fine tuning the sludge removal rate after the water level is established.

7. The settled sludge purge should be operated depending on the rate of sedimentation in the system. Typical purging of the sump should be 5 to 10 seconds. The interval between valve openings should initially be 30 minutes and then adjusted based on operating experience.

DAILY START-UP AND OPERATION PROCEDURES

1. Follow the same sequence as for initial start-up, except that previously established valve and control settings should be maintained and unchanged.

2. Check that the ADT pressures and pressure drop valves are as previously set and that the clarified water is clear.

3. If the MULTIFLOAT was not drained, the Air Dissolving System can be started before the influent feed is turned on. This will help prevent solids build-up in the clarified water during start-up.

INITIAL SHUTDOWN PROCEDURES

1. Turn off the chemical pumps and stop influent flow into the unit.

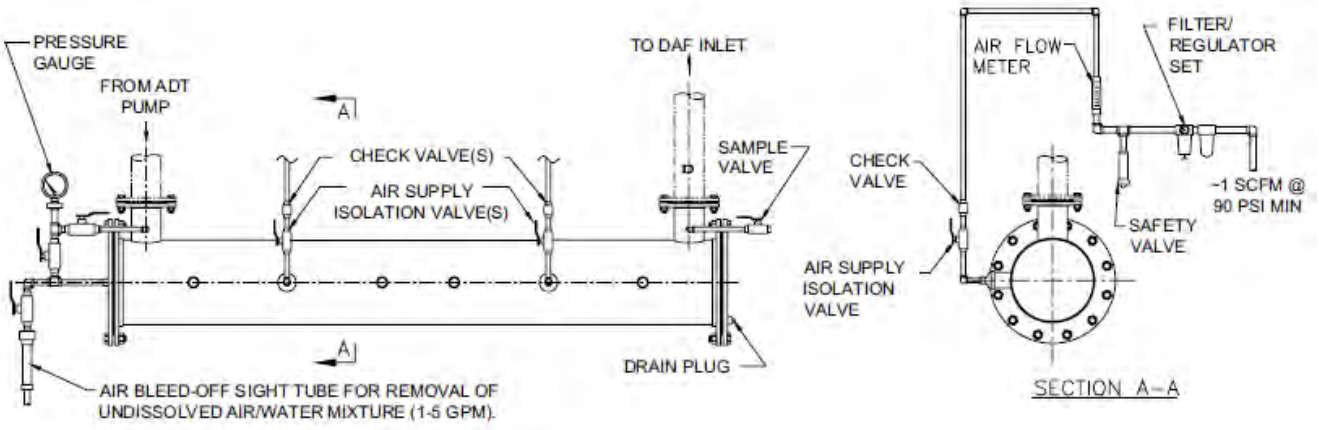
2. Turn off the ADT pressure pump after closing the Air Supply Isolation Valve(s) to the ADT Air Panel(s) and opening the ADT Pressure Release Valve (Globe Valve). Note clean-up is easier if the Air Dissolving System and MULTIFLOAT are allowed to run for a period after the process flow has stopped. Clarified water will recirculate and most of the solids will be flushed from the system.

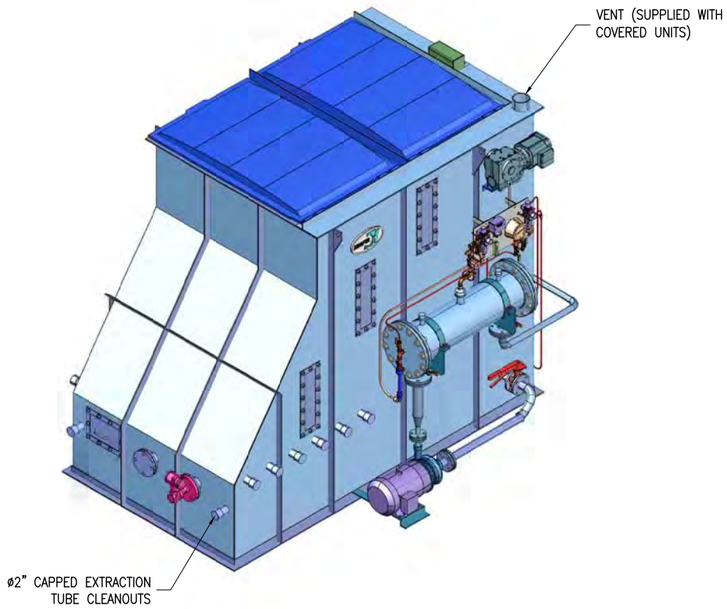
3. Continue to operate the scraper drive until the remaining sludge has been removed.

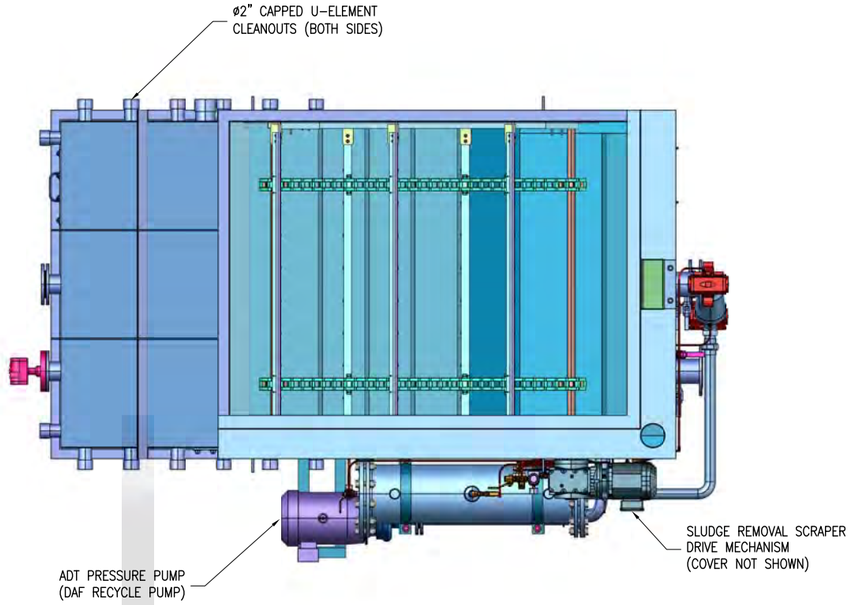
4. Valve and control settings previously established should not be changed.

5. The water does not have to be drained out unless the shut-down is for a period greater than a day or a complete wash-up is necessary.

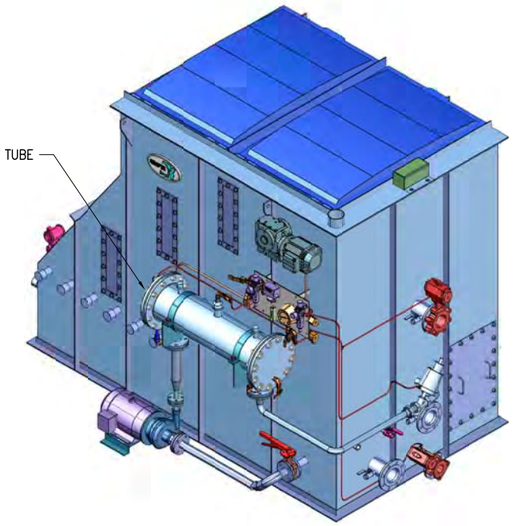
6. If the MULTIFLOAT is drained, hose down all parts thoroughly; dried-on sludge can be difficult to remove.

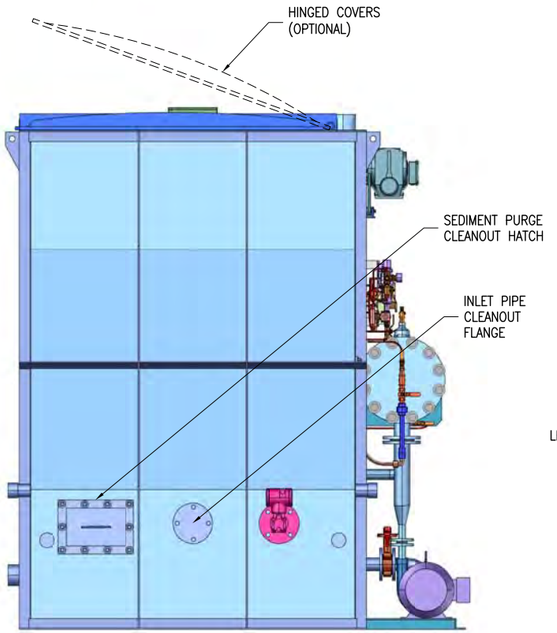




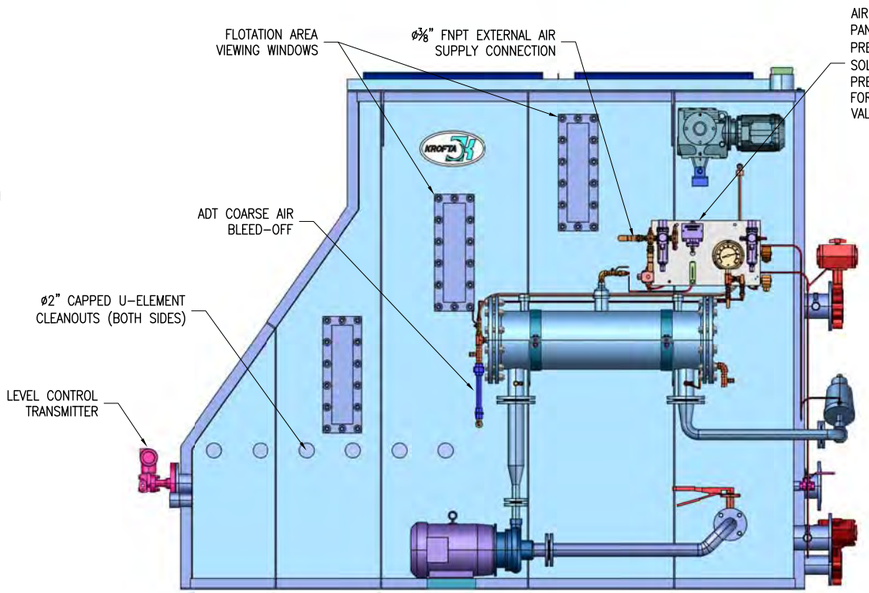


TOP VIEW

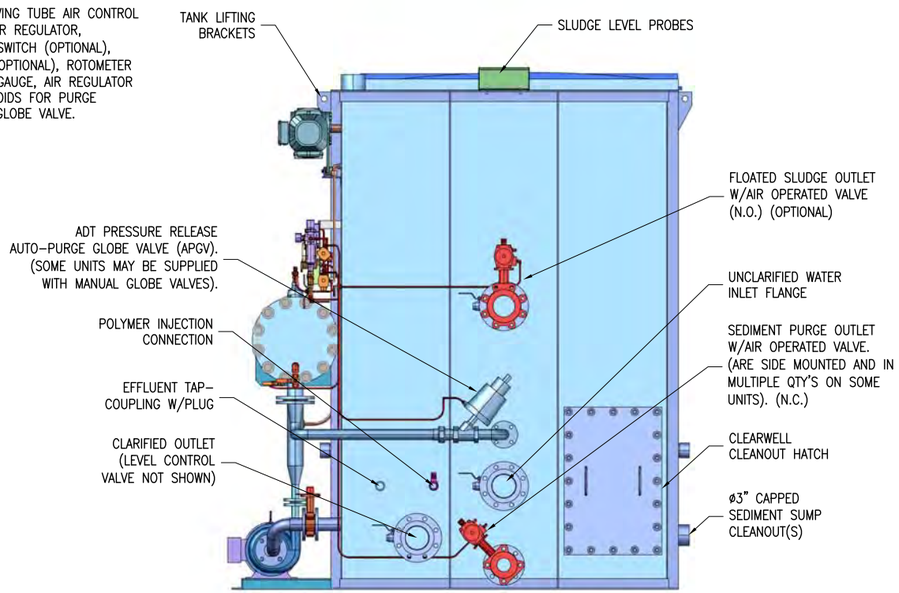




FRONT VIEW



SIDE VIEW



BACK VIEW

PLEASE NOTE – NOT ALL UNITS WILL INCLUDE ALL OF THE DEPICTED COMPONENTS. DRAWING IS INTENDED TO IDENTIFY COMPONENTS CALLED OUT IN OPERATION AND MAINTENANCE MANUAL.

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D

KROFTA a Watereau company
Krofta Technologies LLC
PO Box 7 401 South Street Dalton MA 01227
Tel: 413.236.5634 Fax: 413.236.6917 info@krofta.com

NAME:					
KROFTA MULTIFLOAT HORIZONTAL (MFH) DAF UNIT					
DATE: 03/23/15	SCALE: –	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: KROFTA MULTIFLOAT MFH GENERAL ARRANGEMENT				DRAWING NUMBER: MFH-GA-01	REV:

DAF MULTIFLOAT CLEANING PROCEDURES

Cleaning procedures outlined below are recommended at a scheduled shutdown period as depicted in maintenance schedule (below) or after long periods where the DAF unit has not or will not be operated for a period of time. This timing will deviate based on a given application.

1. Manually turn off the chemicals. Allow clean water to continue to flow into polymer unit in order to flush system. It may be a good idea to run one quart of mineral oil through polymer system to help remove unwanted build up in tubing, chamber and site glass (See Polymer Make-up System O&M for detail).

2 Raise the water level high enough to scrape off any sludge layer that may be present. Allow enough time to pass so that the residual chemistry has had time to dissipate.

3. Shut off feed/influent source

4. Drain the contents of the DAF by opening the Purge valve and running the sludge pump (if tied into purge line) and opening the effluent valve and/or effluent pump (if equipped).

5. Once the unit has been drained:

   a. Follow appropriate Lock-Out Tag-Out procedures for isolating the DAF Unit from the process, as well as shutting down any live electrical/mechanical devices; i.e. Top Scraper Gearbox/motor and paddle mechanism, ADT/Recycle Pump, and any other equipment that could cause potential harm when cleaning the DAF Unit.

   b. The purge valve should be left open in manual. Leave purge valve in this position until the unit has been cleaned thoroughly.

   c. Remove access hatch and clean out any collected sludge within chamber. If Multifloat is a Vertical configuration, make sure to hose down the Extraction Box around the DAF Effluent Outlet.

   d. Open U element clean outs.

   e. Open up flange on inlet side of DAF to enable inlet header to be flushed. Horizontal Units also have a cleanout at the end of the Inlet Header that should also be opened.

   f. Open extraction tube cleanout (this applies to the Horizontal configuration).

   g. Drain ADT and then open up ADT for cleaning.

   h. Thoroughly spray unit down to remove any sludge build up on and within the unit including:

      i. The U elements and plates – please make sure to clean these thoroughly from the top as well as inside the laterals after the clean-out caps are taken off. These elements have slotted distribution holes on the top of each lateral that should be cleaned from any build-up.

ii. Inlet Header Pipe
iii. Air Dissolving Tube and Piping – please note to follow cleaning of Air Dissolving Tube by spraying a soapy water solution onto the Air Dissolving Tube Air Panel(s). Slowly turn air supply to ADT panels and watch for an even distribution of bubbles. If there is not an even distribution of bubbles and/or it takes more than ~10 psi with rotometer @ 10-15 SCFH to see these bubbles form it may be time to change the ADT Air Panel. For ADT Air Panel replacement instructions, please refer to Maintenance and Troubleshooting section.
iv. Viewing windows
v. Scraper assembly
vi. Sludge hopper and Conductance Probes (if equipped)
vii. Clearwell vents (this applies to the Horizontal Configuration)
viii. Purge valve piping
ix. Note: Please use caution near the level sensor as a strong blast of water from a power sprayer can and will damage the sensor.
x. Use hot water or steam if available, and/or power washer if available.

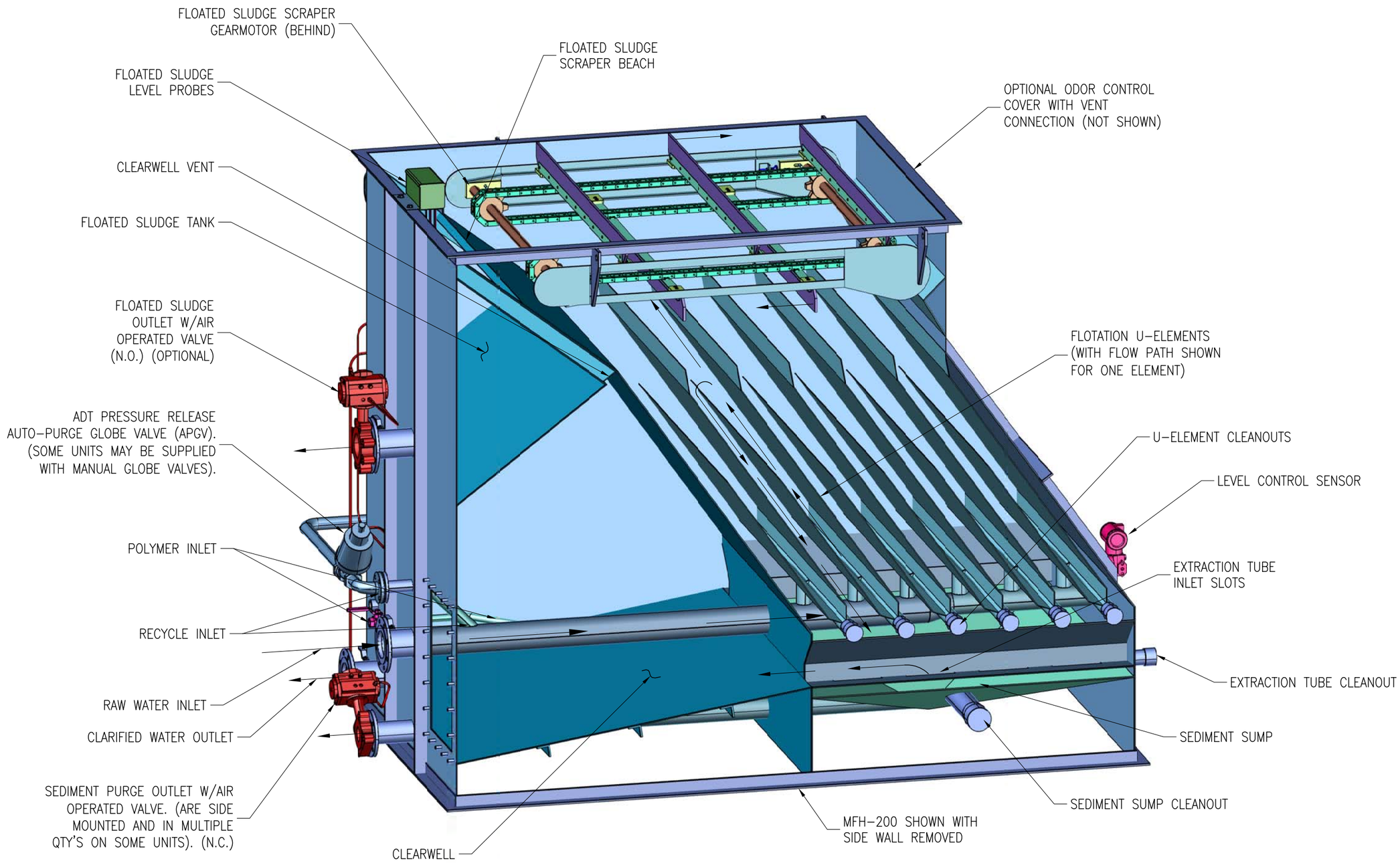
i. A dilute bleach solution may be used on wetted parts as a means of bacteria and odor control after the unit has been cleaned and rinsed. This should be followed by a final rinse.

j. When unit is drained and empty of all water & debris, re-install:

i. Clean-out hatch
ii. U-Element clean-out caps
iii. ADT End Flanges
iv. DAF Inlet Flange
v. Any other items that were opened/disconnected for cleaning

7. Once unit has been cleaned, return all settings back their original CASCADE (Automatic) settings and start up unit.

8. It may be a good idea to take advantage of the unit being down to attend to other system cleaning tasks or PM as required.



KROFTA MULTIFLOAT INTERNAL VIEW

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D

Krofta Technologies LLC
PO Box 7 401 South Street Dalton MA 01227
Tel: 413.236.5634 Fax: 413.236.6917 info@krofta.com

NAME:					
KROFTA MULTIFLOAT					
DATE: 11/04/14	SCALE: –	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: MFH-200 HORIZONTAL DAF INTERNAL VIEWS & DESCRIPTIONS				DRAWING NUMBER: MFH200-INT-01	REV:

MAINTENANCE and TROUBLESHOOTING

GENERAL

KROFTA units should receive a visual inspection at least once weekly, a thorough item-by-item inspection monthly, and lubrication and adjustment on a three-month schedule minimum with continuous operation, or on a six-month schedule maximum with intermittent operation.

MECHANICAL MAINTENANCE

TANK

Only routine cleaning is required for stainless steel.

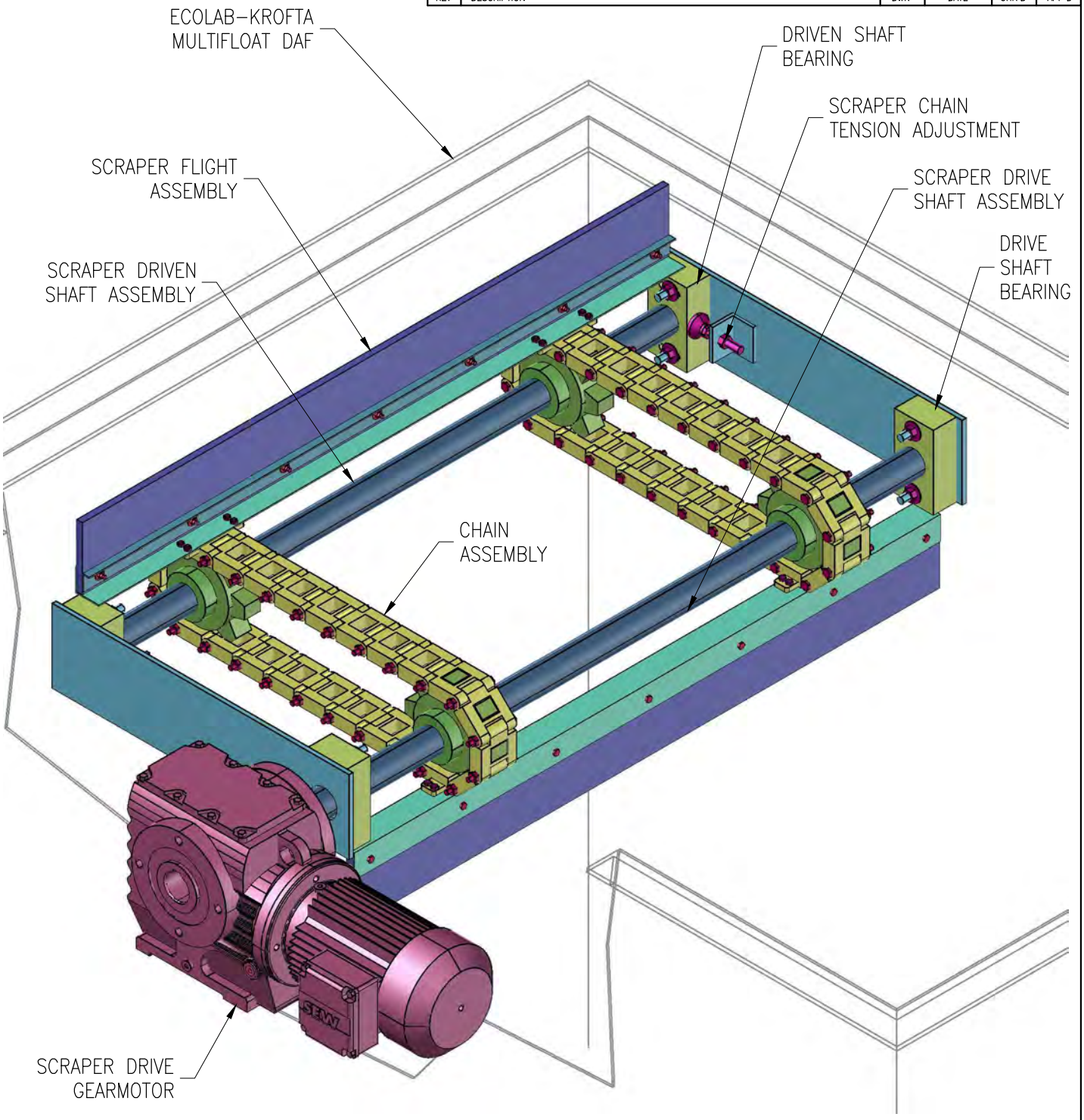
SCRAPER

Check support bearing for excessive wear monthly. The gearbox requires periodic oil changes. Note that an initial oil change may be required soon after start of operation. See the gearbox manufacturers' brochure for more detailed instructions.

Chains should be kept just tight enough to prevent excess sag. Over tightening the chains will cause excessive sprocket and link wear. Please see following instructions for Chain Adjustments.

Scrapers Blades will wear over time and will need replacing. Over time they can lose their elasticity and begin to deform in a wavy pattern. Please see following instructions for replacement of Scraper Blades.

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D



NOTES:

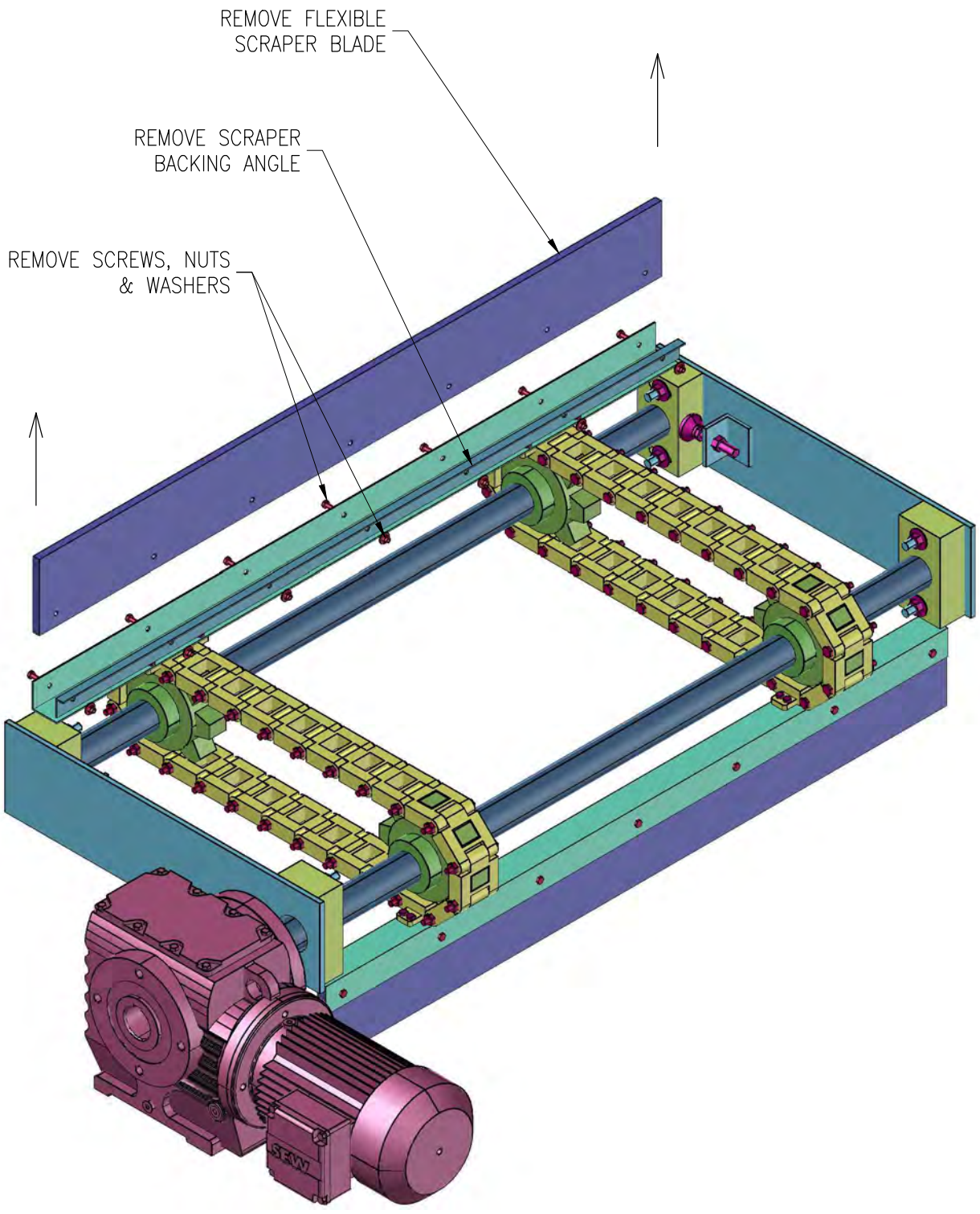
1. CHAINS SHOULD BE KEPT JUST TIGHT ENOUGH TO PREVENT EXCESS SAG. OVERTIGHTENING THE CHAINS WILL CAUSE EXCESSIVE SPROCKET & LINK WEAR.
2. TO ADJUST CHAINS, LOOSEN THE BEARING MOUNTING NUTS & CHAIN TIGHTENER LOCKNUTS. TIGHTEN THE ADJUSTER ONLY ENOUGH TO SET BOTH CHAINS WITH EQUAL TENSION. TIGHTEN BEARING NUTS & ADJUSTER LOCKNUTS WHEN SET.

KROFTA a Waterleau company

Krofta Technologies LLC
PO Box 7 401 South Street Dalton MA 01227
Tel: 413.236.5634 Fax: 413.236.6917 info@krofta.com

NAME: KROFTA MULTIFLOAT SLUDGE REMOVAL SCRAPER					
DATE: 02/07/12	SCALE: NONE	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: SLUDGE SCRAPER SCRAPER MECHANISM COMPONENTS AND ADJUSTMENT				DRAWING NUMBER: MF–OMTS01–1	REV:

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D



ROTATE SCRAPER MECHANISM TO POSITION INDIVIDUAL SCRAPER FLIGHTS IN A CONVENIENT WORKING LOCATION.

KROFTA a Waterleau company

Krofta Technologies LLC
PO Box 7 401 South Street Dalton MA 01227
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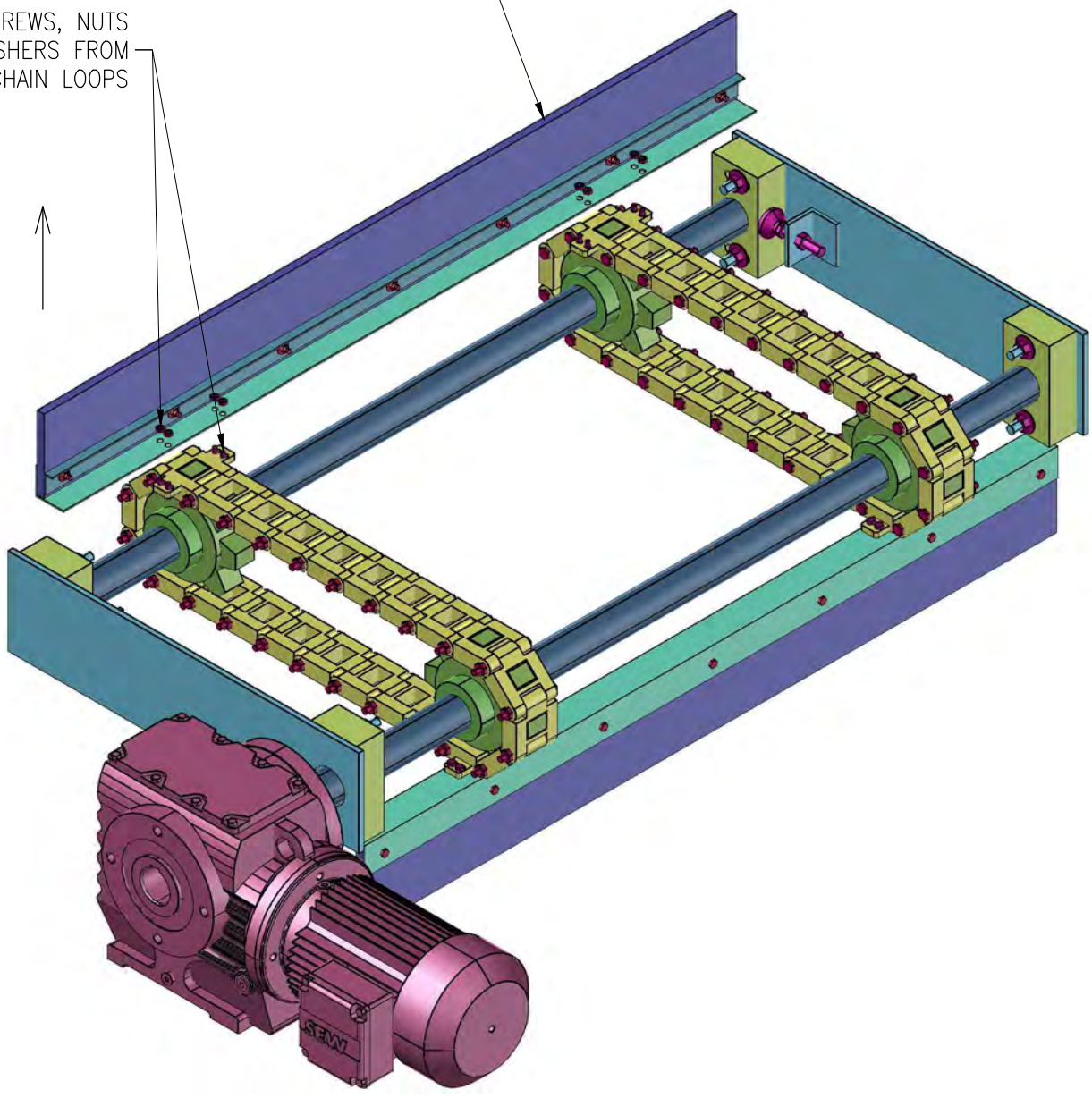
NAME: KROFTA MULTIFLOAT SLUDGE REPLACEMENT					
DATE: 02/07/12	SCALE: NONE	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: SLUDGE SCRAPER FLEXIBLE SCRAPER BLADE REMOVAL PROCEDURE				DRAWING NUMBER: MF–OMTS01–2	REV:

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D

LIFT OFF SCRAPER FLIGHT ASSEMBLY FROM CHAIN LOOPS

REMOVE SCREWS, NUTS & WASHERS FROM BOTH CHAIN LOOPS



ROTATE SCRAPER MECHANISM TO POSITION INDIVIDUAL SCRAPER FLIGHTS IN A CONVENIENT WORKING LOCATION.

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NAME: KROFTA MULTIFLOAT SLUDGE REMOVAL SCRAPER					
DATE: 02/07/12	SCALE: NONE	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: SLUDGE SCRAPER SCRAPER FLIGHT REMOVAL PROCEDURE				DRAWING NUMBER: MF–OMTS01–3	REV:

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D

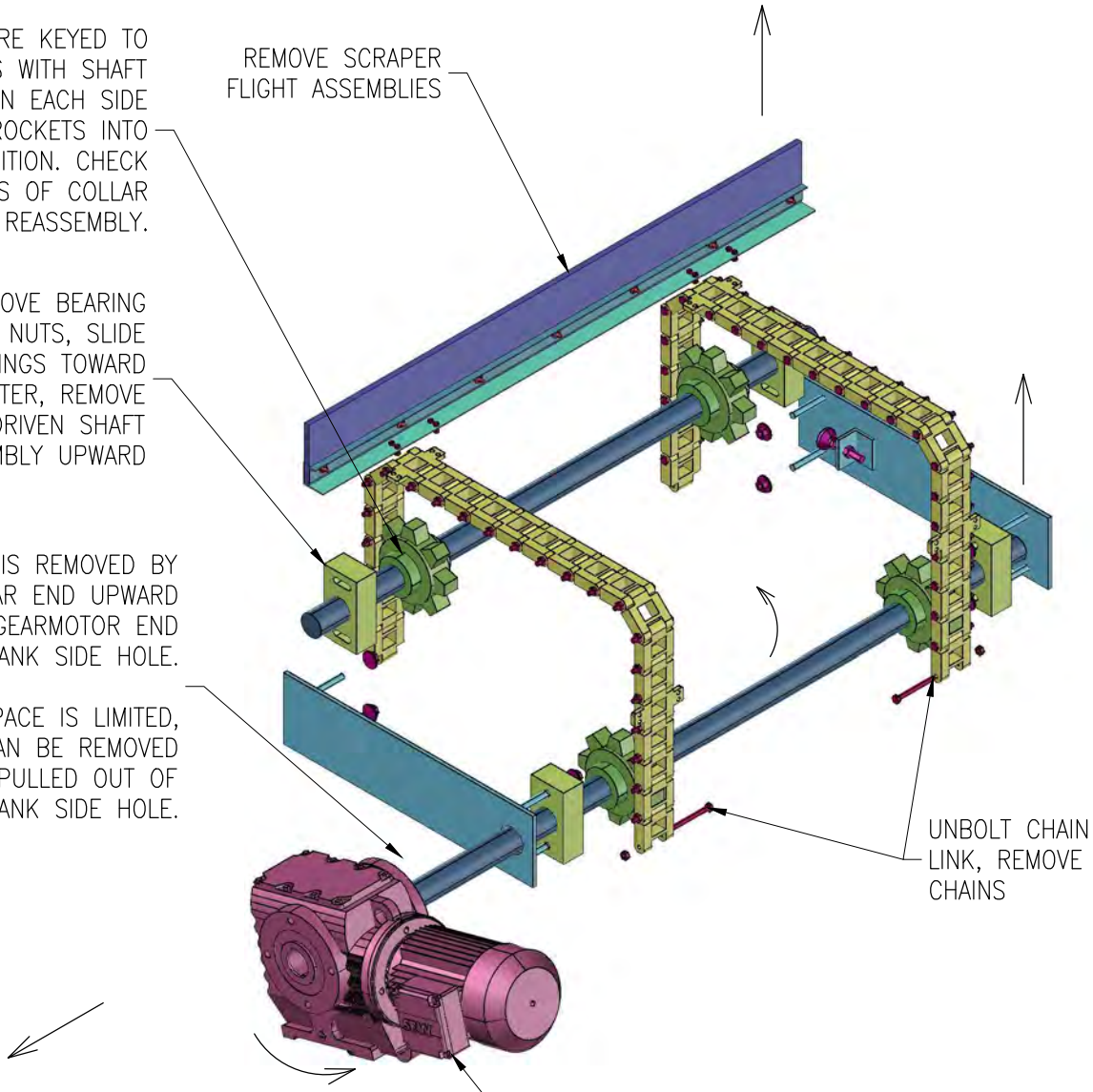
SPROCKETS ARE KEYED TO SHAFTS WITH SHAFT COLLARS ON EACH SIDE TO LOCK SPROCKETS INTO POSITION. CHECK TIGHTNESS OF COLLAR BOLTS AFTER REASSEMBLY.

REMOVE SCRAPER FLIGHT ASSEMBLIES

REMOVE BEARING NUTS, SLIDE BEARINGS TOWARD CENTER, REMOVE DRIVEN SHAFT ASSEMBLY UPWARD

DRIVE SHAFT IS REMOVED BY TIPPING FAR END UPWARD AND PULLING GEARMOTOR END THRU TANK SIDE HOLE.

IF SPACE IS LIMITED, SPROCKETS CAN BE REMOVED AND SHAFT PULLED OUT OF TANK SIDE HOLE.



UNBOLT CHAIN LINK, REMOVE CHAINS

TO REMOVE GEARMOTOR FROM SHAFT, ROTATE AS SHOWN TO CLEAR TORQUE ARM TANK BRACKET, REMOVE BOLT AND WASHER FROM SHAFT END, SLIDE GEARMOTOR OFF SHAFT.

NOTE: TO CATCH DROPPED HARDWARE FROM FALLING INTO MULTIFLOAT UNIT, PLACE A TARP OR SHIELD UNDER SCRAPERS ON TOP OF FLOW PLATES.

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NAME:					
KROFTA MULTIFLOAT SLUDGE REMOVAL SCRAPER					
DATE: 02/07/12	SCALE: NONE	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: SLUDGE SCRAPER ASSEMBLY REMOVAL PROCEDURE				DRAWING NUMBER: MF–OMTS01–4	REV:

THE AIR DISSOLVING TUBE

Check the air dissolving tube every three months. If more than, 15 PSI is required to push air into the ADT with the pressure pump off, the dispersion panels have clogged and must be replaced.

Indications:
From time to time, the ADT panel inserts (vyon) may become clogged or blinded. This will inhibit the compressed air from entering the panel or prevent it from dispersing evenly across the surface of the panel. Should this occur the efficiency of the ADT will decrease dramatically and performance of the DAF will diminish.

Panels can become clogged from excessive polymer use, oil in the air supply lines, bacteriological growth, extended down times, infrequent routine cleaning, or other chemical excursions.

The first sign of plugging of the panel will often be an increase in the % open of the rotometer. Each panel consumes a maximum of 1 SCFM (60 SCFH). If the % open on the rotometer requires that the operator open the rotometer farther open each day to achieve the same air flow rate the panel may be gradually clogging.

Others signs of clogging or binding may be coarse air bubbles in the DAF unit or poor flotation characteristics. A sample of dissolved air can be obtained from the sample port on the discharged end of the tube. The dissolved air that should be visible should stay in solution for a minimum of 30-60 seconds.

Always check the ADT bleed-off valve to ensure that it is approximately 1/3 open during normal operation. Should this valve be closed, air pockets could develop within the tube causing a “plug-flow” around the panel assembly also giving poor air quality in the DAF. If it is closed, it may also give a false indication that the panels are plugging.

Maintenance:
The ADT panels should be inspected and cleaned whenever there is a shutdown of the system. At a minimum, the panels should be cleaned every 6 months and replaced on a yearly basis.

To clean the panels, remove one or both of the end caps as required. A rough long handled brush should be used to scrub the front cover plate and panel.

Soaking for 12 hours or more in a mild acetic acid solution if they are not grossly plugged can rejuvenate the panels.

Replacement Options:

There are three (3) options available for replacement. A complete pre-assembled package is available from the factory. This will allow for quicker replacement and a short equipment downtime. Also available are panel "inserts" only. This option is significantly cheaper but will require more time to install and an extended downtime. The third option is a factory rebuild of the existing assembly. Ship the assemblies' back to Krofta and our shop personnel will mount new inserts to the original assembly using factory original materials.

Replacement Procedure:

Should the panels require replacement, extreme care should be taken as not to damage the stainless steel assembly. The assembly can be re-used with replacement inserts if so desired. Make sure to shut the system down and lock out the recycle pressurization pump. Isolate the compressed air source. Reference #1-#6, and #17-22 if replacing the entire assembly with a complete new assembly and not an insert only.

1. Remove the end cap(s) on the ADT. Inspect the gasket(s). The gaskets may need to be replaced once they are removed if they are damaged or stick to the cap or flange face.
2. Remove the galvanized caps on the outside of the ADT itself exposing the threaded support rods.
3. Disconnect the air line(s) exposing the air injection tube.
4. Un-thread the top nut, washer, and Neoprene O-ring on the center stem (air injection).
5. Un-thread the top nut, washer, and Neoprene O-ring on the threaded support rods (2 for each panel).
6. Remove the assembly from the ADT.
7. Un-bolt the 36 (some assemblies may have 36-44) panel retaining bolts. Replace worn or stripped bolts with 10-24 x 5/8" nylock bolts.
8. Break the silicone seal between the panel and the front plate as well as the rear assembly.
9. Remove the old panel insert *** *SAVE*** the panel will be used as a template for the new panel.
10. Using the just removed panel as a template, mark the position of the bolt locations on the new panel insert.
11. Drill holes at the marked positions using a ¼" drill bit.
12. Lay a ~ ¼" bead of SikaFlex 1-A or comparable silicone adhesive between the rear assembly and the panel. Install the panel with the *smooth* side exposed to the front plate or water interface.
13. - Use SikaFlex 1-A or other approved material for food grade applications or drinking water contact.
14. Thread the bolts through the rear assembly and through the new panel.
15. Install the nuts on all of the bolts through the front palate and rear assembly.
16. Let dry 8-12 hours.
17. Re-Install the assembly into the ADT – The front plate should touch the inner edge of the tube with no gaps.
18. Use care in re-installing the nuts, washers, and Neoprene O-rings on the support rods as well as the air injection stem. If not installed properly water may leak from the ADT while it is in use. In addition, the compressed air may not disperse evenly into the panel insert if the Neoprene O-ring is installed improperly. It is also possible that air could leak out of the stem before it reaches the panel if the Neoprene O-ring is not installed correctly. Do not over tighten any of these nuts as they may strip rendering the panel useless.

19. Test the air system. Liquid soap can be used to check for air leaks and proper installation. Cover the injection point and edges of the panel and look for possible leakage. Repair as needed.
20. Replace the end cap(s) and gasket(s).
21. Remove the lockout tags on the pump system.
22. Re-start the system.

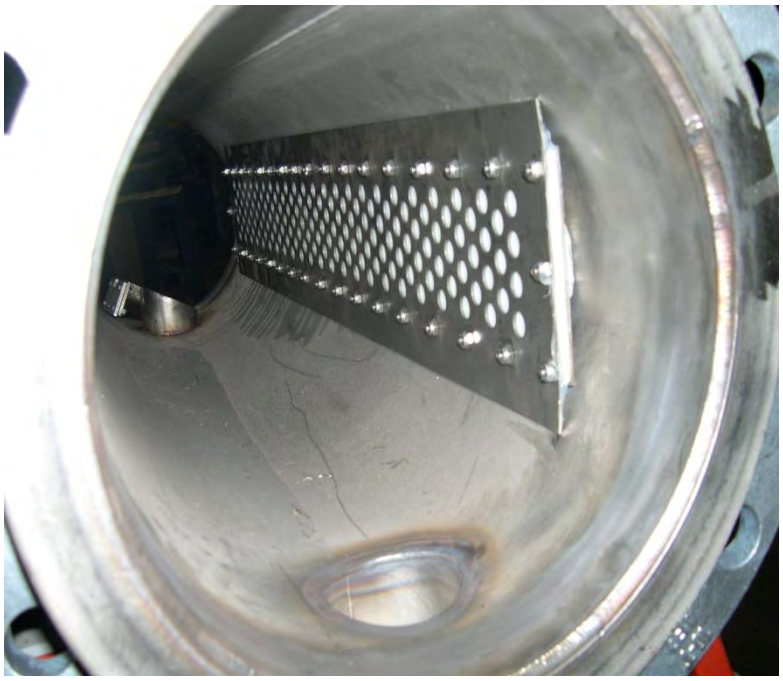
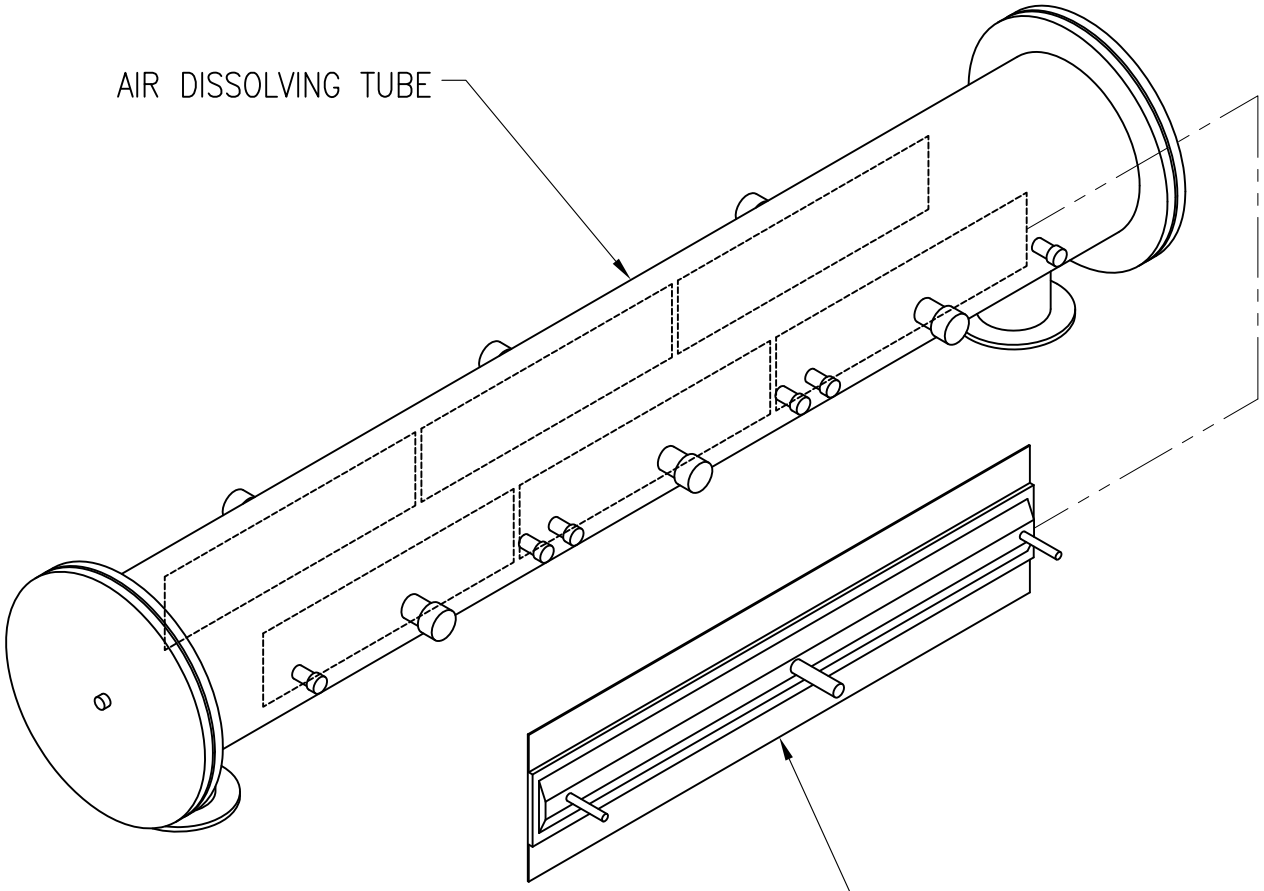


Photo illustrates the inside of an ADT
(As mounted in an ADT300 or ADT500)

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D



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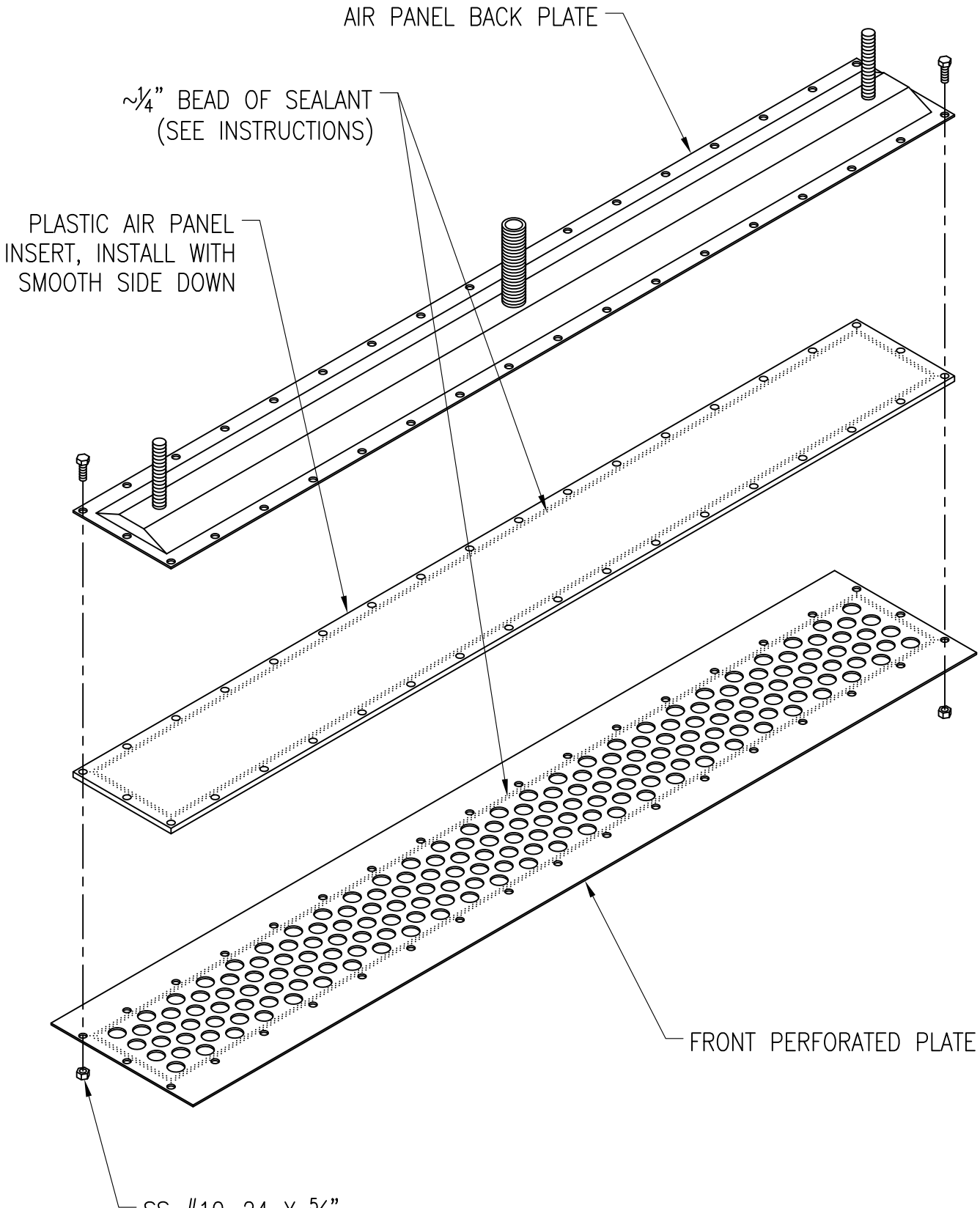
NAME: KROFTA AIR DISSOLVING TUBE					
DATE: 8/08/08	SCALE: NTS	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: AIR PANEL LOCATION				DRAWING NUMBER: 1	REV:

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D



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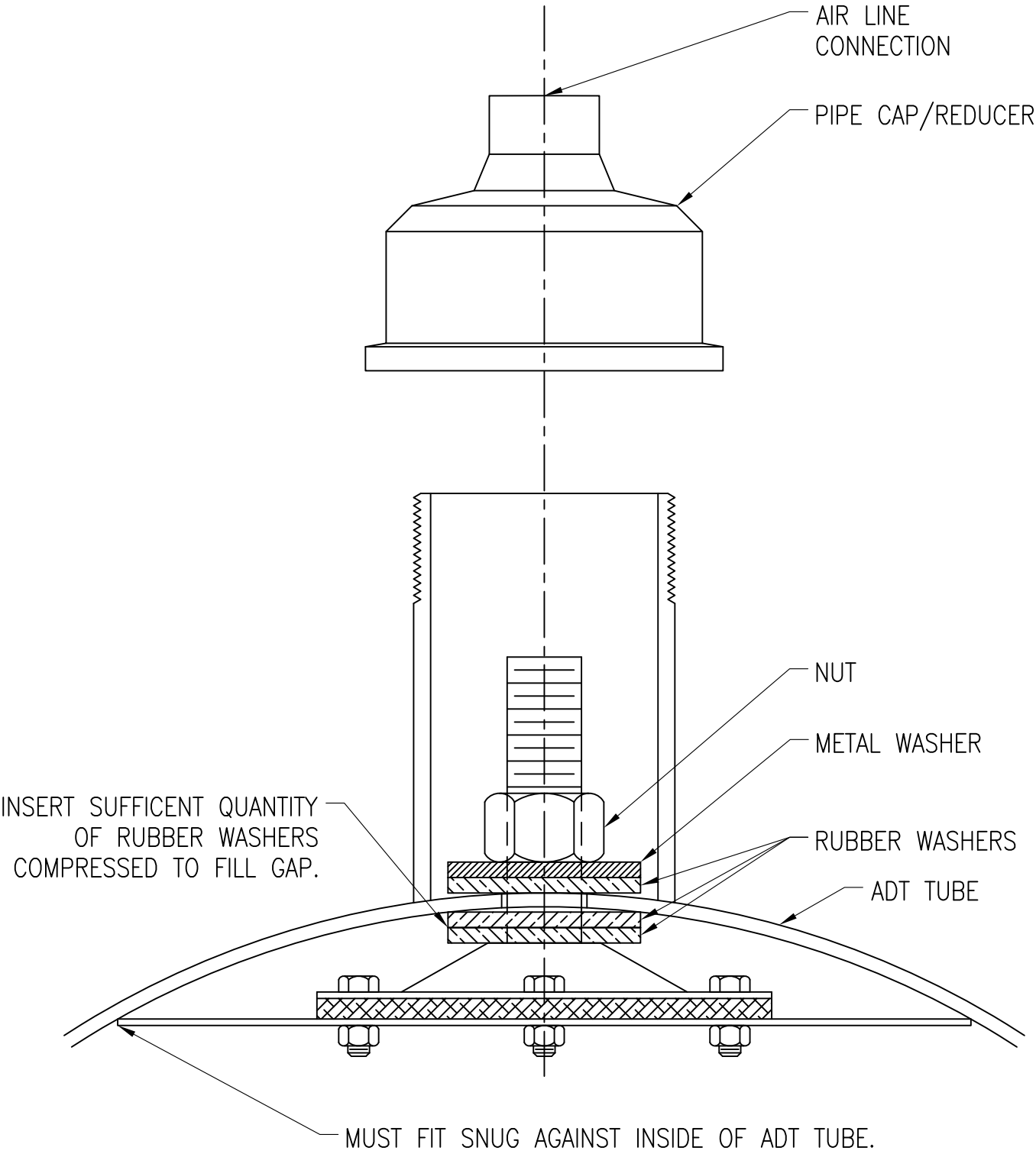
NAME: KROFTA AIR DISSOLVING TUBE					
DATE: 8/08/08	SCALE: NTS	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: AIR PANEL PLASTIC INSERT REPLACEMENT				DRAWING NUMBER: 3	REV:

REV	DESCRIPTION	DWN	DATE	CHK'D	APP'D



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NAME: KROFTA AIR DISSOLVING TUBE					
DATE: 8/08/08	SCALE: NTS	DRAWN BY: PLN	DESIGNED BY:	CHECKED BY:	APPROVED BY:
TITLE: AIR PANEL REMOVAL & INSTALLATION				DRAWING NUMBER: 2	REV:

OPERATIONAL TROUBLESHOOTING

ADT ADJUSTMENTS

Under normal circumstances, no adjustment should be needed after the initial set up. If adjustment is required, make the following checks:

TAKE A SAMPLE FROM THE SAMPLING POINT

This is the best indication of the ADT operation. The sample should be drawn off into a graduated cylinder or other glass container. By looking closely, the air can be observed in the water. The air bubbles should be very small, giving the water a "milky" appearance. Larger bubbles should not be present. If enough air is present, the floc should rise to the surface at a rate of one foot per minute, leaving clear water underneath. The ADT is functioning properly and requires no adjustment if this is what is observed.

CHEMICAL ADDITION

Commissioning, maintenance, and operation of the chemical feed pumps should be attempted only by qualified and properly trained personnel using all necessary personal protective equipment (PPE) recommended for protection from a chemical, which includes eyewear and chemical specific PPE. A copy of the MSDS for each chemical handled should be reviewed and thoroughly understood prior to working on any chemical feed system utilized for a specific chemical.appropriate Personal Protection Equipment (PPE) which may include goggles; face shield; and rubberized coat, pants, and gloves. When performing maintenance on any chemical system, great care should be taken to prevent accidental contact to the chemicals by those persons performing the maintenance task and any other personnel in the area. Contact with chemicals associated with DAF operations has the potential for severe injury to unprotected personnel.

Check to be sure that the chemical pump is functioning properly. A clear piece of pipe in the chemical feed line is useful to allow a visual check of chemical addition into the clarifier.

Changes in the nature of the influent before chemical addition can interfere with the flotation process. Detergents and defoaming agents can cause pH and chemical changes in the influent resulting in poor clarification. Determine that the nature of the influent has remained constant prior to making any chemical changes.

The pH of the waste water stream through the DAF must be monitored and controlled in order to prevent damage to DAF materials and components, to facilitate effective coagulation and flocculation, and to maintain permitted pH levels of the DAF effluent. Failure to properly control and verify pH levels in the DAF system reduces removal efficiency, increases chemical consumption and overall operating costs, may violate discharge permits, and may cause serious and irreversible piping or equipment and material damage that may necessitate repair or replacement of DAF materials, components and ancillary equipment. Krofta Technologies is not liable for such consequences.

Regular verification of the accuracy of pH monitoring and control instrumentation is required. This should be done by comparison to a known standard (buffer solution). The DAF System operator should also document actual chemical usage Vs projected usage to determine the accuracy of automated chemical dosing systems

and to aid in detecting chemical leaks in the system. Failure to properly document the verification methodology and data voids any damage claim.

Elevated temperatures alone or in conjunction with low or elevated pH levels may also increase the likelihood of irreversible damage to DAF materials, components, and ancillary equipment.

Elevated Chloride levels can damage DAF materials and components if not properly monitored and controlled.

KROFTA recommends that an isolation valve should be installed on the discharge side of any pail, drum, tote, tank, or other chemical storage or bulk storage container, and that the isolation valve should be closed and its position verified to prevent accidental discharge or siphoning of any chemical during any maintenance procedures or for any prolonged periods of equipment down time.

Certain agents, gases, coagulants, flocculants, acids, bases/caustics, or any other chemical may adversely affect pH if not controlled and monitored properly, and subsequently may cause severe irreversible damage to Krofta-supplied equipment and materials. Properly maintaining or controlling these levels is the responsibility of the end user. Refer to the chemical vendor-supplied Safety Data Sheets and Specifications for additional safety and exposure precautions, handling recommendations, and materials compatibility.

PRESSURE AND FLOW ADJUSTMENTS

Check the pressure gauges to be sure that the pressures have not changed. If the pressure gauges indicate increasing pressure, this usually means the pressure release valve is plugging. Purge the valve and reset to the correct pressure.

Regulate the air to 90 PSI, a minimum of 10 PSI higher than the internal tube pressure.

THE BLEED-OFF SIGHT TUBE

The Bleed-Off Sight Tube is an integral component of the Air Dissolving System. The Bleed-Off should be partially open (about 1/3rd) whenever the Air Dissolving System is in operation and checked to insure that an air/water mixture is being discharged. If water only is discharged from the bleed-off, check the system to make sure that it is operating at proper pressure and flow. Increase air into the system in small quantities until an air/water solution is discharged. If air only is discharged from the bleed-off, reduce the air meter settings. Excess air may cause turbulence in the clarifier or excessive foaming.

SOLIDS OVERLOADING PROBLEMS

Overloading is the result of an unusually high solids level in the MULTIFLOAT, as can occur at wash-ups or at times of heavy solids loading from the process. Overloading can cause unclear water and in extreme cases physically clog parts of the system. The most effective solution is to simply decrease the solids loading if possible. If the overload clogs the system with sludge, the system will unclog itself when the overload stops, unless the thick sludge is allowed to clog the plates.

TROUBLESHOOTING TURBULANCE

Excessive turbulence in the solids floatation area of the DAF may be caused by either to excess recycle flow entering the raw water feed or distribution tubes at the base of the U tube may be plugged up with solids. As the air/water, mixture from the ADT enters the unit it is divided into the distribution tubes for even delivery across the unit. There is ¼ inch by one-inch slots that the process water is fed through into the main chamber of the DAF where the solids rise to the float zone and the clean effluent sinks to the clear well. Any debris that is hard and larger than the slots in the distribution tubes will plug the slots and direct water flow to an open slot. If a large number of these slots are blocked pressure builds up in the unit and excessive turbulence is the result.

To clear the blockage the unit must be drained and the end caps for the distribution tubes need to be removed. A piece of 1 ¼" or 1 ½" O.D. by 6 feet long pipe(PVC recommended) can be used as a tool to shear off any protruding debris. When the PVC pipe is sent through the distribution tube, you will be able to "feel" the slots and notice when they are cleared of the material. Using a flashlight, visually inspect the inside of the tubes and confirm the removal of the debris. After the inspection, use a hose to flush out any remaining material. It is very important to remove remaining debris so as not to re-plug the slots.

On the clarified side of the DAF, a plugged or partially plugged extraction area can cause a back up of water flow and manifest itself as turbulence in the float zone. If the purge valve is not working or is not open for a sufficient amount of time to purge out any heavy or sinking solids, over time this condition will build up solids and block the extraction area. It is imperative to inspect the purge valve on a regular basis for functionality and confirm operational status. Make sure the purge valve is opening for a long enough period to purge out any solids that may have accumulated. A visual inspection by way of draining the DAF and opening the access hatch can quickly tell if the area is plugged or clear. It is recommended to have a 5 second purge every sixty minutes for normal operation. Process water conditions may change from day to day and from plant to plant so in times of heavy solids loading you may want to purge the system more often.

MULTIFLOAT (MF) MAINTENANCE SCHEDULE*							
No.	ITEM	SHIFTLY	WEEKLY	MONTHLY	3-MONTHS	6-MONTHS	YEARLY
1	Inspect Sludge Scraper to Ensure Float Layer is Being Removed	X					
2	Check Scraper Speed and Timer Setting	X					
3	Inspect Rubber Scraper Blades		X				
4	Replace Rubber Scraper Blades (If Needed)					X	
5	Inspect Scraper chain assembly (adjust if needed)		X				
6	Inspect Scraper Gear motor (grease as necessary)				X		
7	Check Auto-Level Control System & Water Height	X					
8	Check/Clean Sludge Conductivity Probes	X					
9	Test Purge Valve		X				
10	Inspect Clearwell vent for debris (Clean as necessary)	X					
11	Check Compressed Air Pressure to ADT (Min. of 90psi)	X					
12	Check Differential Pressure Across ADT (5-10 # Differential)	X					
13	Check ADT Discharge Pressure (Min. 65 psi)	X					
14	Check Rotometer Flow (Max. 30 SCFH)	X					
15	Check ADT Bleed-Off Valve (~1/3 Open)	X					
16	Inspect/Clean ADT Panel(s)					X	
17	Replace ADT Panel(s)						X
18	Check/Flush (purge) Globe Valve	X					
19	Drain and Clean Unit			X			
20	Check All Bolts and Flanges for Tightness			X			
21	Check air pressure & needle valve setting to AOD pumps	X					
22	Inspect DAF Feed & Effluent Pumps for Leaks or Debris	X					
23	Inspect Influent & Effluent FCV's for Function and Moisture in Positioner	X					
24	Drain Compressor and Regulator Traps	X					
25	Verify Compressor Cut-out & Cut-in Pressures (if equipped)	X					
26	Check Compressor oil level fill as necessary (if equipped)		X				
27	Check Compressor filter (if equipped)		X				
28	Check Chemical Metering to Pumps to Ensure Chemicals are Being Dosed – Acid, Caustic, Coagulant & Flocculants	X					
29	Inspect Chemical Feed/Injection Points (valves and fittings)			X			
30	Inspect Polymer Make-up Units	X					

MULTIFLOAT (MF) MAINTENANCE SCHEDULE*							
No.	**ITEM**	**SHIFTLY**	**WEEKLY**	**MONTHLY**	**3-MONTHS**	**6-MONTHS**	**YEARLY**
31	**Clean Polymer Make-up Units**			**X**			
32	**Check pH probe for fouling clean as necessary**	**X**					
33	**Calibrate pH probe via Buffer solutions**			**X**			
34	**Check Turbidity probe for fouling, clean as necessary (If equipped)**	**X**					
35	**Calibrate Turbidity probe with Cal solution (If equipped)**			**X**			
36	**Lubricate/grease all motors/bearings/gearboxes**				**X**		
*	**This is a typical inspection list. Note: individual site conditions vary and may require more frequent inspection, verification and maintenance.**	**X**	**X**	**X**	**X**	**X**	**X**

SAFETY RECOMMENDATIONS

This document is an overview of the Safety Requirements for Krofta supplied equipment for the general knowledge of operators and vendors. It is assumed that the facility where Krofta equipment is installed has an established written Safety Program. The following document is recommended protocol for handling Krofta equipment during installation and operation and maintenance procedures but not to supersede the facilities established safety program.

Lockout Tag Out -It is required that whenever personnel are working on or in a Krofta unit or on the ancillary equipment for the Krofta units, that the main disconnect power switch for the unit be placed in the off position and a lock be placed on that switch, with a tag identifying the owner of the lock, to prevent unauthorized or accidental repowering of the systems. At no time should any adjustment, inspection, or maintenance be preformed or undertaken on or in the Krofta unit without the entire unit being completely shut down with the main power switch to the electrical equipment properly shut off and locked and tagged out.

Electrical Control Panel -The electrical control panel contains high voltage electrical components and can be hazardous to personnel through electrical shock should there be accidental contact with those components. During normal operation of the Supracell unit, the cabinet must remain in the closed position. Only qualified and authorized personnel should be allowed access to the interior of the cabinet. No wash-ups of the area near the electrical control cabinet should be allowed without the door being properly closed. Failure to keep the door closed during wash-ups can result in the destruction of the electrical components inside the cabinet and risk of electrical shock to nearby personnel.

Multifloat DAF Units

Guards -All Krofta DAF units are equipped with equipment safety guards for operator protection from outside the unit. Krofta units should not be run without all supplied guards properly installed in place.

Elevated Supracell DAFs -Krofta DAF units are often installed in an elevated position for operation convenience and space savings. It is suggested that elevated units be provided with a platform and railings to provide safe access to the DAF Unit. Normal maintenance procedures on the DAF units are easily and safely conducted from these platforms. Should maintenance procedures require access beyond what is afforded by the platform, additional safety procedures must be employed, specific to that procedure. If the platform is utilized to gain access into the DAF tank, the main control switch must be placed in the off position, locked, and tagged out. See above. Because the DAF unit is elevated, when working beyond the access platform, Krofta recommends utilizing standard OSHA approved fall protection equipment to prevent injury to personnel working in unprotected locations.

Air Dissolving System **-** Krofta DAF units utilize dissolved air in the recycle stream to remove solids. The air is entrained into the recycled water stream in the Krofta Air Dissolving Tube (ADT). That air is supplied to the ADT under pressure by an air compressor at a value greater than the pressure to the system provided by the recycle pump. Compressed air or pressurized water has the potential to inflict

injury by accidental release of that energy. Prior to working on the ADT and associated equipment, the main equipment disconnect must be placed in the off position and properly locked and tagged out. See above. After the switch is placed in the off position and locked out, the pressure must be released from the system by opening the bleed valve on the ADT prior to performing any maintenance task.

DAF Influent and Effluent Pumps -For a specific project check to see if the pump(s) are isolated and installed with dedicated electrical disconnects. Prior to any maintenance tasks being performed on the DAF pump, the electrical disconnects for those pumps must be placed in the off position, properly locked, and tagged out. Any residual pressure stored in the piping associated with the specific pump should be released prior to any maintenance procedure. If the pump is not isolated and equipped with dedicated disconnects then follow the proper shutdown procedures and lockout or tag out that equipment.

Sludge Pump -Any maintenance on the sludge pump should only be attempted after shutting down all systems, placing the main power switch in the off position, properly locking out, and tagging that switch. Any residual pressure in the discharge pipe should be released prior to working on the pump.

Chemical Feed Systems -Before any maintenance operation is conducted on any chemical feed system, the main power switch to the entire system must be placed in the off position, properly locked, and tagged out. See above.

Proper operation of a DAF system often requires the use of chemistry to obtain the desired performance of the system. Krofta typically provides the necessary chemical feed pumps and associated tanks to dose the proper chemistry into the system.

Chemical placement within the operating area should adhere to the OSHA standards governing chemical safety.

If a chemical metering system is being commissioned for the first time, the fully installed chemical metering system must be pressure and leak tested using clean water before priming and charging the chemical metering system with the chemical to be used.

Maintenance and operation of the chemical feed pumps should only be attempted by qualified and properly trained personnel using appropriate Personal Protection Equipment (PPE)... When performing maintenance on any chemical system, great care should be taken to prevent accidental contact to the chemicals by those persons performing the maintenance task and any other personnel in the area. Contact with chemicals associated with DAF operations has the potential for severe injury to unprotected personnel. Some chemicals commonly used in water and waste water treatment may damage valves, piping, seal materials, and equipment, including but not limited to stainless steel vessels such as tanks, mixing tubes, and DAFs if the recommended dosing levels, and control, storage, and delivery application techniques are not observed. Appropriate PPE is necessary when working on or around pressurized piping, pumps, valves, tanks, or equipment that may contain any chemical.

Therefore, Krofta recommends that during any maintenance task performed on the chemical feed systems, the maintenance personnel doing that maintenance must be properly trained for handling that specific chemical and that the operator wears, at a minimum, all necessary personal protective

equipment (PPE) recommended for protection from that chemical which includes eyewear and chemical specific PPE. A copy of the MSDS for each chemical handled should be reviewed and thoroughly understood prior to working on any chemical feed system utilized for that specific chemical.

Chemical feed pumps have the potential for developing high pressure in the lines associated with the pump. Every care should be taken to relieve that pressure prior to working on that pump. Failure to relieve pump pressure could result in unnecessary exposure to the pumped chemical and could result in serious personnel injury.

Air Compressor - If an air compressor is provided with your equipment package, please review the following. The Air Compressor cycles on and off according to compressed air consumption in the plant. While in the off mode, the compressor system remains pressurized. Should maintenance be required on the air compressor, that equipment must also be locked out as per the above instruction and any pressure released prior to any maintenance task being performed.

SPARE PARTS

Ordering Replacement Parts:

To order replacement ADT Panel Assemblies, Inserts, or any other Krofta style replacement parts, please contact:

KROFTA TECHNOLOGIES
PO Box 7, 401 South Street, Dalton, MA 01227
Ph: 413-236-5634 Fax: 413-236-6917
Email: John.Cronin@Krofta.com
Website: www.kroftatech.com

KROFTA/OPERATORS LOG

Company: **Date:**

Location: **Unit:**

Sample ID/#				
Sample Description				
Date				
Hour/Min				
Influent Flow, gpm				
Influent pH				
Influent pH Setpoint & Deadband				
Acid Pump #1 setting				
Caustic Pump #1 setting				
Coagulant #1 Pump Setting				
Coagulant #1 ppm (Panelview)				
Coagulant #1 Drawdown (ml/min)				
Coagulant #2 Pump Setting				
Coagulant #2 ppm (Panelview)				
Coagulant #2 Drawdown (ml/min)				
Polymer #1 Pump Setting				
Polymer #1 ppm (Panelview)				
Polymer #1 Drawdown (ml/min)				
Polymer Dilution Water (psi & gpm)				
Effluent pH				
Effluent pH Setpoint & Deadband				
Acid Pump #2 Setting				
Caustic Pump #2 setting				
ADT psi (in/out)				
Air Pressure (psi & SCFH)				
APGV Settings (Frequency/Duration)				
Sludge Depth, inches				
Sludge Flow, gpm				
Scoop/Scraper Output (rpm & Hz)				
Scoop/Scraper Timer (Frequency/Duration)				
Purge Timer (Frequency/Duration)				
Carriage Speed (rpm & Hz) SPC Only				
Turbidity In (NTU)				
Turbidity Out (NTU)				
Other Parameter Test (In)				
Other Parameter Test (Out)				

Chemicals/Type/Name/Number/ID/Pump Size, Type and Tube Size (if Applicable)

Acid

Caustic

Coagulant #1

Coagulant #2

Polymer #1

Comments:

TRAINING LOG

Company:

Location: **Unit:**

Trainer:

TRAINEE (PRINTED):	TRAINEE (SIGNATURE):	DATE:	TIME:

Comments: