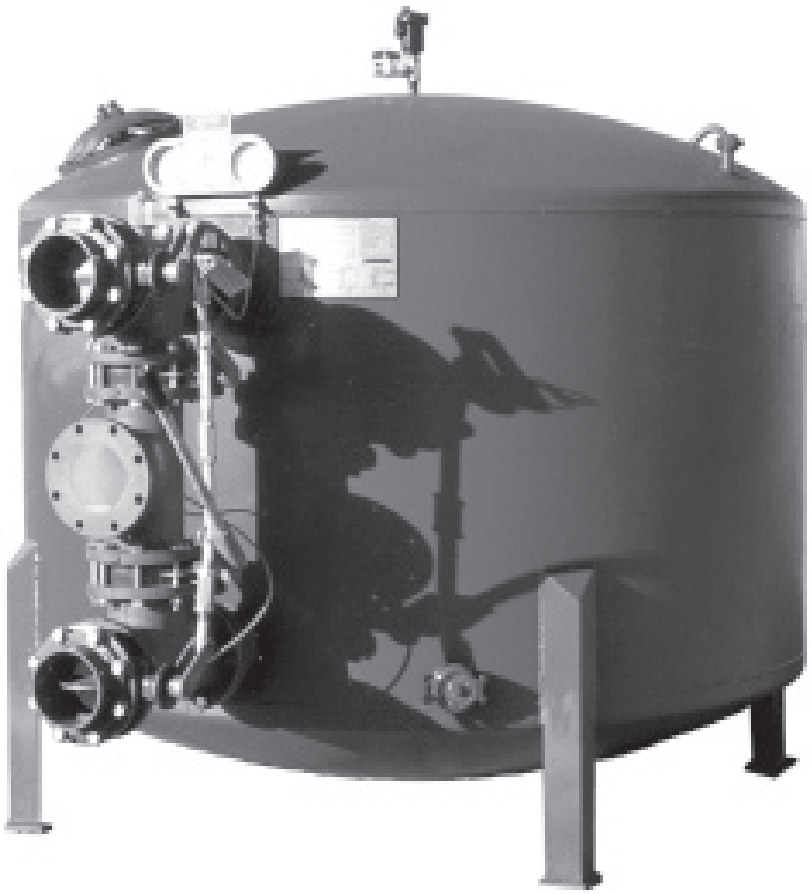
COMMERCIAL HI-RATE FILTER SYSTEMS



Operating and Maintenance Manual

Owner: _____

_____

_____

_____

Contractor: _____

_____

_____

_____

Equipment Supplier: _____

_____

_____

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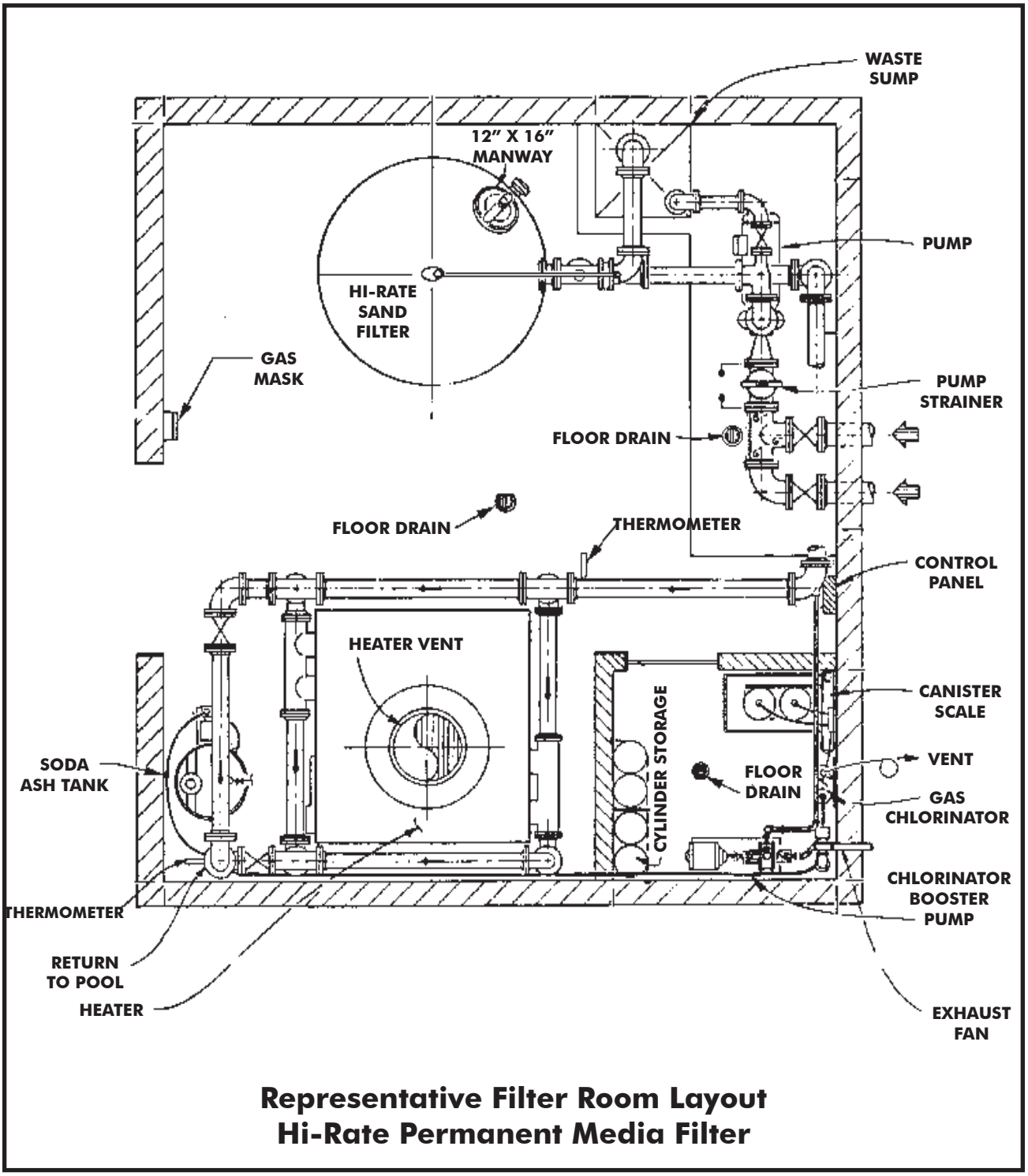
Eureka Manufacturing Company
Commercial Hi-Rate Sand Filter Systems

Manufacturing Facility
402 B Avenue
Eureka, SD 57437

Sales & Engineering
PO Box 1473
Bismarck, ND 58502

Typical Filter Room Layout



Representative Filter Room Layout
Hi-Rate Permanent Media Filter

Specifications Hi-Rate Sand Filters

Part I - General

Prologue:
.01 It is the intent of these specifications to describe a swimming pool High-Rate Sand Filter constructed of A-36 carbon steel.

.02 This specification includes but is not limited to the following components:

- Filter Tank
- Interior Lining
- Interior Distribution System
- Face Piping with Valves
- Single Lever Control Linkage
- Fully Automatic Backwash
- Backwash Alarm Unit
- Filter media

.03 The filter system described in these specifications reflect the Model #HRL series filter, fabricated by Eureka Manufacturing Company, Eureka, South Dakota.

.04 It is not the intent of these specifications to limit competition. Any substitute system must be approved by the Architect/Engineer ten (10) days prior to the bid date. All base bids must include the specified filter. Any substitutes shall be quoted by the bidding contractors as an alternate.

Reference:
.01 The following standards shall be incorporated herein, but not limited to:

NSF - NSF *International*
AISI - American Iron and Steel Institute
ANSI - American National Standards Institute
AWS - American Welding Society
ASTM - American Society for Testing Metals
ASME - American Society of Mechanical Engineers

Quality Assurance:
.01 The manufacturer shall have a minimum of ten (10) years experience in the fabrication of High-Rate Sand Filters for public swimming pools. The filter system shall be of the vertical type and be tested and Certified by NSF *International* for a maximum flow of 20 gallons per minute per square foot of filter area.

.02 The hydraulic calculations shall be performed to assure compliance with code requirements as well as guarantee the proper recirculation rates.

.03 The material loading and storage shall be performed by the contractor. The materials shall not be stacked or stored in a manner that may cause damage. The material shall be stored in accordance with the manufacturers specifications.

Submittals:
.01 Product data and shop drawings: Submit product data, shop drawings and installation instructions for the filter and related components clearly indicating rated capacities, gauges of material, finishes, etc. . .

Warranty:
.01 The filter shall be guaranteed by the manufacturer for workmanship, materials and performance for a period of _____ ( ) years. The warranty will not include abusive or improper treatment of the filter during construction or under operation.

.02 The manufacturer shall provide complete instructions detailing proper care, maintenance and cleaning of the filter system.

Part II - Products:

Filter System Capacity:
.01 The filter system shall consist of _____ ( ) filter tank(s), complete with face piping, operating valves, complete gauge panel with 4.5" gauges, automatic air relief vent, backwash sight glass, bottom drain connection with internal media retainer, and internal distribution system.

.02 The system shall be fabricated and fully assembled by the original equipment manufacturer. The face piping and system accessories shall be removed from the system and shipped individually. The collection and diverter headers are to be factory installed and internally braced for transit.

Filter Area:
.01 The filter system shall consist of _____ ( ) High-Rate permanent media filters(s) with a total effective area of _____ sq. ft. when operating at _____ gpm per square foot of filter area. The filter system will have a capacity of filtering _____ gallons in _____ hours.

Filter Tank:
.01 A standard 12" x 16" manway complete with flange, steel cover, gasket, bolts, nuts and yokes, shall be located in the top head.

.02 The filter tank(s) shall be _____ in diameter with a side shell height of _____ and shall be constructed of high quality type A36 carbon steel. The tank shall be _____ thick. Dished and flanged heads shall be _____ thick. The tank(s) shall be suitable for a working pressure of 60 psi and hydrostatically tested at 90 psi.

.03 A media dump port and drain shall be provided in the side shell. Influent and effluent connections shall be located in the tank side shell and shall be schedule 40 steel pipe.

.04 Each filter tank shall be equipped with replaceable sacrificial anodes that protect the tank from corrosion caused by electrolysis.

.05 HRG filter tank(s) shall be supported by strap legs up to and including 42". HRL filter tank(s) shall be supported by angle iron legs up to and including 120".

.05 *(option)* Adjustable jack legs are available on all filter

sizes.

Interior Lining:
.01 All interior, wetted surfaces of the filter tank(s) and all penetrations shall be degreased and sandblasted prior to lining installation.

.02 Tank lining shall be an epoxy-type coating, and shall be applied to all wetted surfaces of the tank and tank penetrations in two successive coats. Twelve hours curing time shall be allowed between coats, and the total thickness shall be 8 to 12 mils.

.03 The finished lining shall be smooth, dust free, and completely nontoxic. The lining shall be visually examined and spark tested for pinholes.

Exterior Coating:
.01 The filter shall be painted with one (1) coat of zinc oxide primer after the trial assembly by the original equipment manufacturer.

Internal Distribution System:
.01 Filter internal equipment shall include an upper distribution assembly and a lower collection system, hydraulically balanced to prevent turbulence and/or displacement of the media during filtration. Standard pipe arrangement or internal valving systems will not be acceptable.

.02 The upper distribution system shall include hydraulic injection molded ABS plastic distribution lenses located uniformly over the filter bed. They shall be joined to the influent connection by means of a schedule 80 PVC pipe header.

.03 The lower collection system shall consist of a schedule 80 PVC pipe header and cycolac laterals designed to retain the filter media with minimum head loss. The internal distribution system shall be designed to promote media bed circulation during backwash.

Face Piping with Valves:
.01 The High-Rate Sand Filter(s) shall be provided with all the necessary face piping and valves which shall be pre-assembled by the original equipment manufacturer. The face piping shall consist of flanged standard cast iron fittings and a sight glass.

.01 *(option)* The Hi-Rate Sand Filter(s) shall be provided with all the necessary face piping and valves which shall be pre-assembled by the original equipment manufacturer. The piping shall consist of schedule 80 PVC pipe and spools with standard PVC fittings and a sight glass.

.02 Face piping shall be _____ inch I.P.S. with flanged fittings, mating influent and effluent connections on the filter tank.

.03 The butterfly valves up to and including 8" shall be of the wafer type with a cast iron body, bronze disc, stainless steel stem, with a 100 psi bubble tight shut off.

.03 *(option)* The butterfly valves up to and including 8" shall be of the wafer type with a PVC body, PVC disc, stainless steel stem, with a 100 psi bubble tight shut off.

.04 Piping is to be drilled and tapped at the influent and effluent ports to accommodate gauge panel tubing.

.05 A sight glass designed for 150 psi working pressure shall be fitted on the backwash line. It shall consist of a 1.5" I.P.S. cast brass base and cap with a 3" diameter acrylic lens.

Single Lever Control Linkage:
.01 The linkage shall consist of a unilever operator linkage complete with double operator arms of aluminum which shall be heat treated to a T6 temper for strength and durability. Couplings and jam nuts shall be provided to facilitate adjustment of linkage. Connecting rods and high strength shear pins shall also be provided.

.02 Valves shall be set to move concurrently with one pair opening and the other pair closing to avoid water hammer and to simplify operation.

Fully Automatic Backwash:
.01 *(option)* The automatic backwash controller shall switch the filter system from filtration to the backwash cycle. Electronic systems control the timing and duration of the backwash while automatically interrupting operation to a safe mode if failure occurs.

Backwash Alarm Unit:
.01 *(option)* The backwash alarm unit shall function on a preset pressure differential. When the preset high is reached on the differential switch it will alert the operator with a pulse type audible beeper. The unit shall continue to beep until the filter is backwashed thoroughly enough for the differential pressure to return to normal and allow the panel to reset itself. All components are to be enclosed in an 8" x 8" weatherproof box. Incoming power is 120V, and all components are reduced to 12V for safety.

Filter Media:
.01 *(not included)* Filter media shall consist of uniformly graded silica sand which shall be free of limestone or clay. Filter media shall be grade #20, effective size of .45-.55 millimeter with a uniformity coefficient of 1.6 maximum. Support media shall be hard, uniformly graded 1/8" to 3/8" gravel. No limestone or clay shall be present. Alternative media must be approved by Eureka Manufacturing Company.

Part III - Execution:

Quality Control:
.01 The entire filter system shall be inspected prior to shipment to verify compliance with the fabrication drawings.

.02 The filter manufacturer shall provide a separate book containing equipment cut sheets on all the major components, as well as information on the operation and maintenance of the system.

Rate and Capacity Charts

Model Number	Tank Diam.	Sq.Ft. of Filter Area	Rate and Capacity				Cubic Feet 1/8"-3/8" Gravel Req.	Cubic Feet #20 Sand Required	Approx. Bed Depth Required	Approx. Shipping Weight (lbs)	Operating Weight (lbs)
			15 GPM Rate	20 GPM Rate	Gal. per 6 Hours	Gal. per 8 Hours					
HRG 30	30"	4.9	74	- -	26,640	35,520	5	10	30"	424	2,379
			- -	98	35,280	47,040					
HRG 36	36"	7.1	107	- -	38,520	51,360	9	12	30"	539	3,609
			- -	142	51,120	68,160					
HRG 42	42"	9.6	144	- -	51,840	69,120	11	21	30"	776	5,182
			- -	192	69,120	92,160					
HRG 48	48"	12.6	189	- -	68,040	90,720	15	23	30"	886	7,796

Model Number	Catalog Number	Tank Diam.	Sq.Ft. of Filter Area	Rate and Capacity				Cubic Feet 1/8"-3/8" Gravel* Required	Cubic Feet #20 Sand* Required	Approx. Bed Depth Required	Approx. Shipping Weight	Operating Weight (lbs)
				15 GPM Rate	20 GPM Rate	Gal. per 6 Hours	Gal. per 8 Hours					
HRL 48	FE-24303-0111	48"	12.6	—	252	90,720	120,960	20	25	30"	1,524	8,010
HRL	FE-24304-0101	54"	15.9	238.5	—	85,860	114,480	26	32	30"	1,644	9,657
54				—	318	114,480	152,640					
HRL	FE-24305-0101	60"	19.6	294	—	105,840	141,120	32	39	30"	1,766	12,464
60				—	392	141,120	188,160					
HRL	FE-24306-0101	66"	23.7	355.5	—	127,980	170,640	41	47	30"	1,899	14,739
66	FE-24306-0131			—	474	170,640	227,520				2,246	15,125
HRL	FE-24307-0131	72"	28.3	424.5	—	152,820	203,760	50	57	30"	2,388	18,142
72				—	566	203,760	271,680					
HRL	FE-24308-0111	78"	33.2	498	—	179,280	239,040	61	67	30"	2,978	21,700
78				—	664	239,040	318,720					
HRL	FE-24309-0111	84"	38.5	577.5	—	207,090	277,200	73	77	30"	3,186	25,663
84				—	770	277,200	369,600					
HRL	FE-24310-0101	90"	44.2	663	—	238,680	318,240	87	89	30"	3,402	31,776
90				—	884	318,240	424,320					
HRL	FE-24311-0101	96"	50.3	754.5	—	271,620	362,160	102	101	30"	3,657	36,686
96	FE-24311-0111			—	1006	362,160	482,880	104	113	36"	4,407	38,681
HRL	FE-24312-0101	102"	56.7	850.5	—	306,180	408,240	118	114	30"	4,548	42,430
102	FE-24312-0111			—	1134	408,240	544,320	121	128	36"	5,405	44,795
HRL	FE-24313-0101	108"	63.6	954	—	343,440	457,920	140	143	36"	5,665	53,305
108				—	1272	457,920	610,560					
HRL	FE-24314-0101	120"	78.5	1177.5	—	423,900	565,220	183	177	36"	6,314	64,845
120				—	1570	565,200	753,600					

Model Number	Catalog Number	Tank Diam.	Sq.Ft. of Filter Area	Rate and Capacity				Cubic Feet 1/8"-3/8" Gravel* Required	Cubic Feet #20 Sand* Required	Approx. Bed Depth Required	Approx. Shipping Weight	Operating Weight (lbs)
				15 GPM Rate	20 GPM Rate	Gal. per 6 Hours	Gal. per 8 Hours					
HRL	FE-24303-0248	48"	25.2	378	—	136,080	181,440	40	52	30"	2,119	15,162
248				—	504	181,440	241,920					
HRL	FE-24304-0254	54"	31.8	477	—	171,720	228,960	52	64	30"	2,360	18,454
254				—	636	228,960	305,280					
HRL	FE-24305-0261	60"	39.2	588	—	211,680	282,240	64	80	30"	2,603	24,448
260				—	784	282,240	376,320					
HRL	FE-24306-0266	66"	47.4	711	—	255,960	341,280	82	96	30"	3,201	29,596
266				—	948	341,280	455,040					
HRL	FE-24307-0272	72"	56.6	849	—	305,640	407,520	100	132	36"	3,485	40,020
272				—	1132	407,520	543,360					
HRL	FE-24308-0278	78"	66.4	996	—	358,560	478,080	122	155	36"	5,081	47,142
278				—	1328	478,080	637,440					
HRL	FE-24309-0284	84"	77	1155	—	415,800	554,400	146	180	36"	7,654	56,159
284				—	1540	554,400	739,200					
HRL	FE-24310-0291	90"	88.4	1326	—	477,360	636,480	174	206	36"	9,125	69,588
290				—	1768	636,480	848,640					
HRL	FE-24311-0396	96"	100.6	1509	—	543,240	724,320	208	234	36"	9,525	83,655
296				—	2012	724,320	965,760					
HRL	FE-24311-2101	102"	113.4	1701	—	612,360	816,480	242	265	36"	10,275	89,590
2102				—	2268	816,480	1,088,640					

* Media requirements are approximate. Please follow the operating manual for media installation instructions. Filter media shall consist of uniformly graded silica sand which shall be free of limestone or clay. Filter media shall be grade #20, effective size of .45 - .55 millimeter with a uniformity coefficient of 1.75 maximum. Support media shall be hard, uniformly graded 1/8" to 3/8" gravel. No limestone or clay shall be present. Alternative media must be approved by Eureka Manufacturing Company.

Valve Sequence Charts

Valve Sequence - HRG Systems

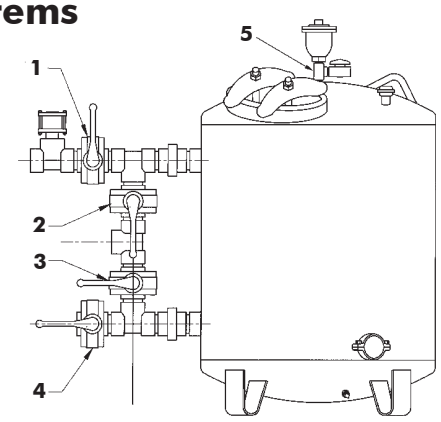


Figure 3

Valve Sequence - Single HRL Systems and Dual HRL Systems

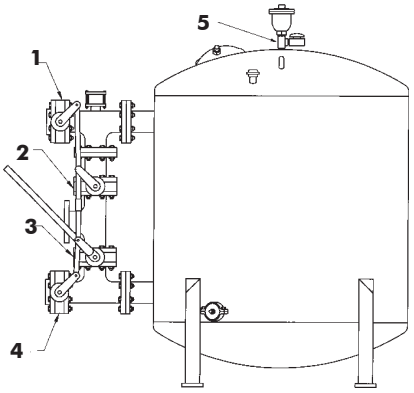


Figure 4

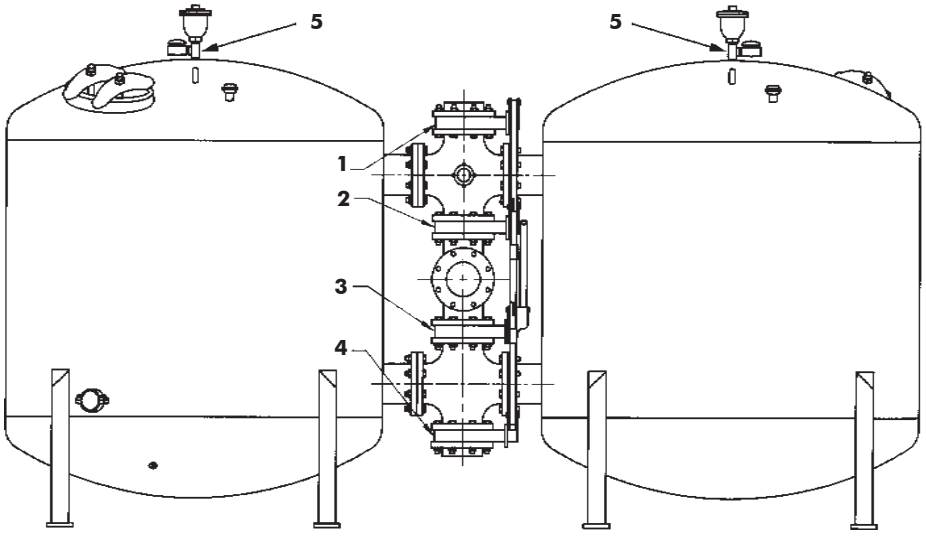
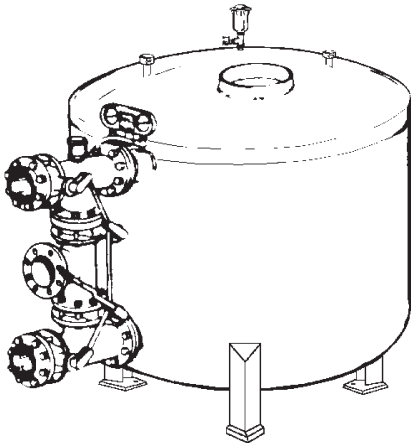


Figure 5

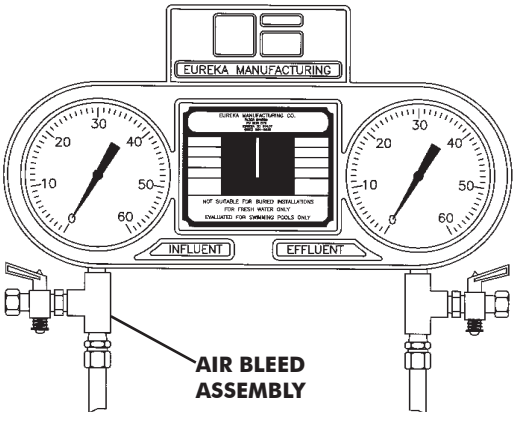
Internal Components Installation Procedures

1. FACE PIPING INSTALLATION



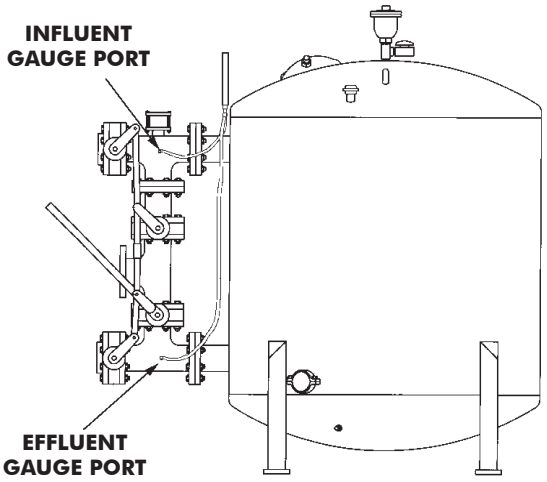
1. Orient the face pipe assembly with the influent gauge port, gauge panel port, and sight glass ports on the uppermost tee.
2. Fasten to the filter tank using the supplied bolts and gaskets.
3. Attach gauge panel support bracket to the filter tank's influent flange.

2. GAUGE PANEL INSTALLATION



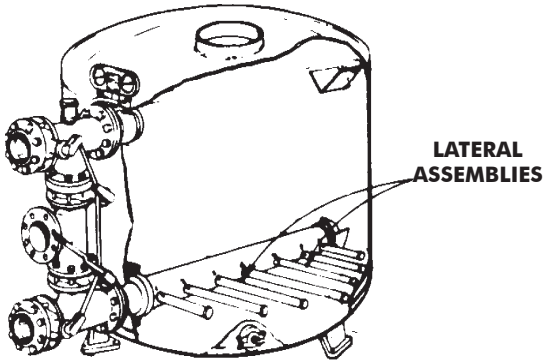
1. Construct air bleed assemblies as instructed in box 3.
2. Insert gauges and air bleed assemblies into gauge panel. Mount gauges and gauge panel to filter by affixing gauge panel mounting bar to the gauge panel.
3. Bolt this gauge panel assembly to the filter through the gauge panel mounting bracket welded to the filter tank, near the top head and flanges. Install pressure gauges, gauge panel assembly and influent and effluent lines as instructed.

3. PRESSURE GAUGE HOOK-UP



1. To build air bleed assemblies, attach one brass petcock to one brass tee. Connect one tubing connector (fitting) to lower leg of the tee. Repeat. Refer to illustration in box #2 on page 6.
2. Attach one air bleed assembly to each gauge. See illustration in box #2 on page 6.
3. Attach gauges with air bleed assemblies to the gauge panel face plate with supplied gauge clamps. Attach gauge panel assembly to bracket supplied on the filter.
4. Install tubing connectors into the influent and effluent gauge ports tapped into the face pipe assembly.
5. Attach one length of tubing to influent gauge at the lower leg of the brass tee. Use enough tubing to make smooth bends; be careful not to kink tubing. Attach the other end of this length of tubing to the influent gauge port on the upper tee of the face pipe assembly.
6. Attach one length of tubing to effluent gauge at the lower leg of the brass tee. Use enough tubing to make smooth bends; be careful not to kink tubing. Attach the other end of this length of tubing to the effluent gauge port on the lower tee of the face pipe assembly.
7. Position the air bleed valves in the closed position.
8. Run the filter through the initial start-up procedure detailed on page 8.
9. After the filter has run to waste, then thoroughly backwashed, air must be bled from the influent and effluent gage lines. While the system is in the filter mode, open one petcock and release all air. Close petcock. Repeat with the remaining line. This procedure will help ensure accurate pressure gauge readings.

4. LATERAL INSTALLATION

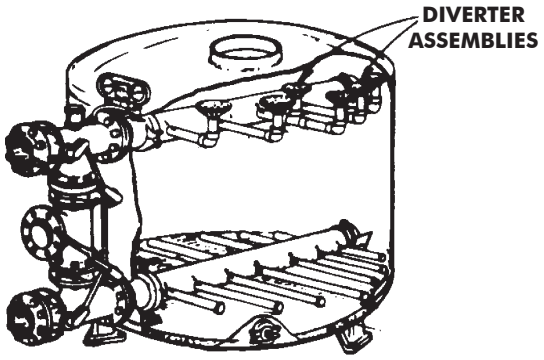


1. Carefully begin to fill the lower portion of the tank with the specified pea gravel. Continue to fill the tank with gravel until it is about 2 inches below the collection header.

2. <u>Remove plastic sleeving from laterals and header</u>.

3. Begin threading laterals into position at one end, and work toward the opposite end. Care must be taken not to cross thread laterals into header. Do not stand on lateral assembly, as excessive weight concentrations can cause damage to the parts. Slots in lateral assembly must face down to insure proper operation.

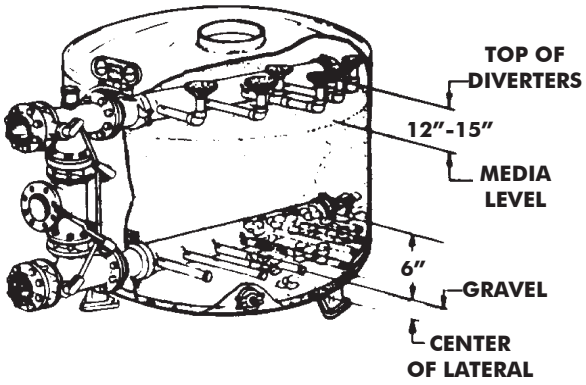
5. DIVERTER INSTALLATION



1. Begin threading diverters into the diverter header. Begin at one end, and work toward the opposite end. The chart on page 14 will help you determine the placement of each diverter arm.

<u>NOTE:</u> The installer must be careful not to step on any laterals during this procedure. The laterals may crack under the weight. Cracked laterals are a serious problem and must be replaced before the filter will operate properly.

6. MEDIA INSTALLATION

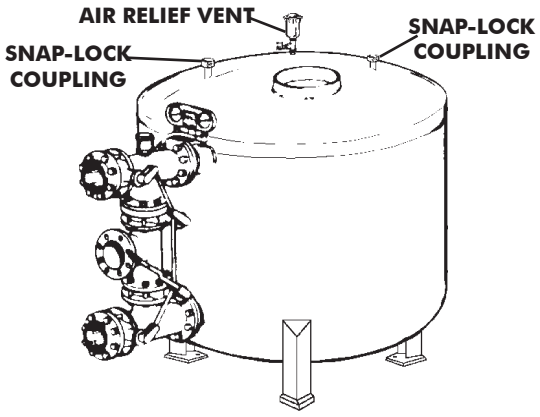


1. Gently pour pea gravel into the filter until all laterals are covered. Again, be extremely careful not to crack the laterals. Continue filling tank with pea gravel until the center of the laterals are 6" below the gravel surface.

2. Fill tank with #20 silica sand until the level is approximately 12" to 15" from the top of the diverters.

<u>NOTE:</u> The tank may be partially filled with water before pouring in the media to cushion the laterals from breakage.

7. ANODE AND AIR RELIEF VENT ASSEMBLY



1. Snap open couplings on the anode ports in the top head and remove plugs. Thread one anode into each plug. Insert plugs and anodes into tank and close each coupling.

2. Using pipe dope, thread the air relief vent onto relief port on top of filter. Connect supplied drain hose to the air relief valve vent and run the hose down side of tank toward floor drain.

Preparation for Initial Filter Operation

Prior to initial start-up, the owner or contractor must have on hand, chlorine and soda ash (if gas chlorine is to be used). These materials are generally called for in the building specifications and are normally supplied by the contractor.

Read the following instructions carefully before attempting to operate the filter, as damage may be caused by improper valve settings. Prior to actual start-up, it is recommended the operator go through several dry runs, becoming familiar wtih the mechanics of the particular system. Once familiar with the operation, proceed with the actual initial start-up.

Please remember that this equipment will last many years if *PROPER maintenance procedures are followed and the unit is not abused.* Misuse and lack of maintenance will cause short life and frequent shutdown time for major maintenance and troubleshooting procedures. If the maintenance instructions are followed, trouble-free operation will be provided by the filter.

If, and when, replacement parts are necessary, please refer to the particular part by number when ordering. A complete parts breakdown of the filter tank is located in the back of this booklet.

PREPARATION FOR INITIAL START-UP

A newly constructed swimming pool will normally have debris in the suction lines, such as pipe compound, oil, grease, dirt, and/or plaster. In order to protect the filter media from this debris, the filter must be run directly to waste for several minutes to clean all suction lines before starting the filter operation.

Valve Positions for Filter to Waste

HRG Models: Valves 1 & 2 Open
Valves 3 & 4 Closed
Manual Air Relief Vent Closed

Note: HRL Models: Linkage must be removed for independent valve settings. (See Figures 4 & 5) Install Linkage again. Note, adjust for positive closing.

HRL Models: Valves 1 & 2 Open
Valves 3 & 4 Closed
Manual Air Relief Vent Closed

Note: The single lever is up for the filter setting and down on backwash. The valve shaft ends are grooved parallel to the disc to facilitate alignment.

PROCEDURE:

A. Open the main drain suction valve, remove the hair and lint strainer lid, replacing same when strainer is full of water. (Flooded suction systems only). (Self-priming units must be primed by filling strainer pot with water from an outside water supply-city water or other).

B. Turn on the pump and operate the system to waste for approximately two minutes on each individual suction line (Main drain, vacuum, gutter or skimmer lines).

C. When the lines have been "blown out," turn off the pump, close all suction valves, drain the filter tank, (if the water has entered) and open Valve #5, allowing air to enter tank, thus draining the water. After filter has drained, remove hair and lint strainer basket, clean thoroughly and replace.

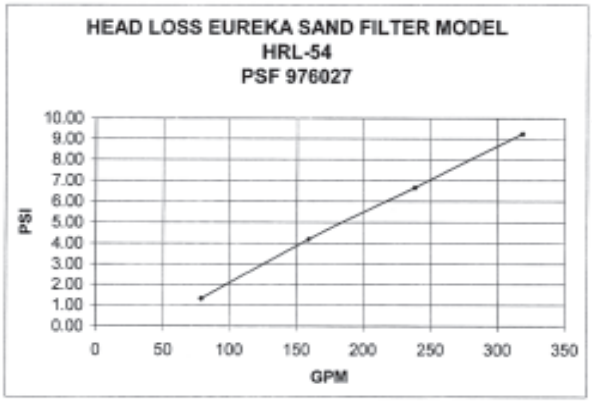
After this initial starting procedure has been accomplished, the filter system is ready for the initial filtering operation.

D. Always commence initial operation with filter valves in the backwash position. The procedure is required as the filter is seeking its operating free board level and a quantity of excess media will be discharged to waste.

Initial Backwash Valve Positions:
Valves 1 & 3 Open
Valves 2 & 4 Closed
Valve 5 Open until air has expelled
(See Figure 4 & 5)

Backwash approximately four (4) minutes or until the presence of sand in the backwash water has disappeared.

After this initial starting procedure has been accomplished, the filter system is ready for the normal filter operation.



HRL - 54
HEAD LOSS CURVE

Refer to the Valve Sequence Charts on Page 7

FILTER MODE

1. Valve settings for filtration are:
   All suction valves.....OPEN
   Note:(except vacuum lines)

2A. Set valves on the "HRG" Hi-Rate as follows:

Valve #1 ..... CLOSED
Valve #2 ..... OPEN
Valve #3 ..... CLOSED
Valve #4 ..... OPEN
Valve #5 ..... OPEN
(until air is expelled) ***See Fig. 3***

2B. Set valves on the "HRL"Hi-Rate as follows

Single Lever ..... Up position (to filter)
Valve #5 ..... OPEN
(until air is expelled) ***See Fig. 4 & 5***

3. Start main circulating pump. Hi-Rate filters, models HRG & HRL, are designed to operate in the filtration cycle until a differential pressure reading of 15 to 20 psi is reached between the effluent and influent pressure gauges or after seven (7) days, (whichever comes first). At this time, the unit must be backwashed.

Note:
The filtration and backwash procedures may have to be performed several times during the first few days of operation, depending on the source of water and its clarity.

BACKWASH MODE

Backwash should occur when a 15 psi differential pressure is indicated on the gauge panel or every seven days, whichever is sooner.

Example:
Influent Gauge Reading of 25 psi
Effluent Gauge Reading of 5 psi(25 minus 5)
= 20 psi differential

When this differential or time is indicated, shut off the main circulating pump. Set the valves in the backwash position, start circulating pump.

The water is now flowing from the bottom of the tank, through the sand and out the top to waste.

BACKWASH OPERATION VALVE SEQUENCE

1. Valve settings for Backwash are:

Main drain suction line ..... OPEN
Skimmer (gutter), vacuum & return lines ..... CLOSED

2A. Set valves on the "HRG" Hi-Rate as follows:

Valve #1 ..... OPEN
Valve #2 ..... CLOSED
Valve #3 ..... OPEN
Valve #4 ..... CLOSED
Valve #5 ..... CLOSED
See Figure 3

2B. Set valves on the "HRL" Hi-Rate as follows:

Single Lever ..... DOWN POSITION
Valve #5 ..... CLOSED
See Figure 4 & 5

3. Start main circulation pump. Backwash for approximately four (4) minutes. Observe the backwash water through the sight glass, if turbid water continues to appear, backwash until clear water appears.

Refer to the Valve Sequence Charts on Page 7

Troubleshooting Guide

Troubleshooting and Preventative Maintenance Procedures:

Eureka Manufacturing's Hi-Rate filters are void of moving parts and therefore, require a minimum of maintenance. The filter media is the most important item which requires periodic examination.

There are two common problems which occur with the Hi-Rate sand filters, none of these are related to the unit itself, but are human error.

1. Media being discharged into the pool.

Cause:
A. Underdrain damaged or installed incorrectly.
B. Incorrect media (excessive fines)

Solution:
A. Remove media (by way of media dump port); repair underdrain and reinstall media.
B. Check media size, if incorrect replace it with proper grade. (See page 5)

2. Pool water not clearing up.

Cause:
A. Incorrect media
B. Rate of flow in excess of 20 gpm.
C. Pool chemistry.
D. Original water source.

Solution:
A. Remove media and install correct media.
B. Adjust flow rate.
C. Consult local water chemist.
D. Special pretreatment or special treatment after pool is filled - consult local water chemist or factory representative.

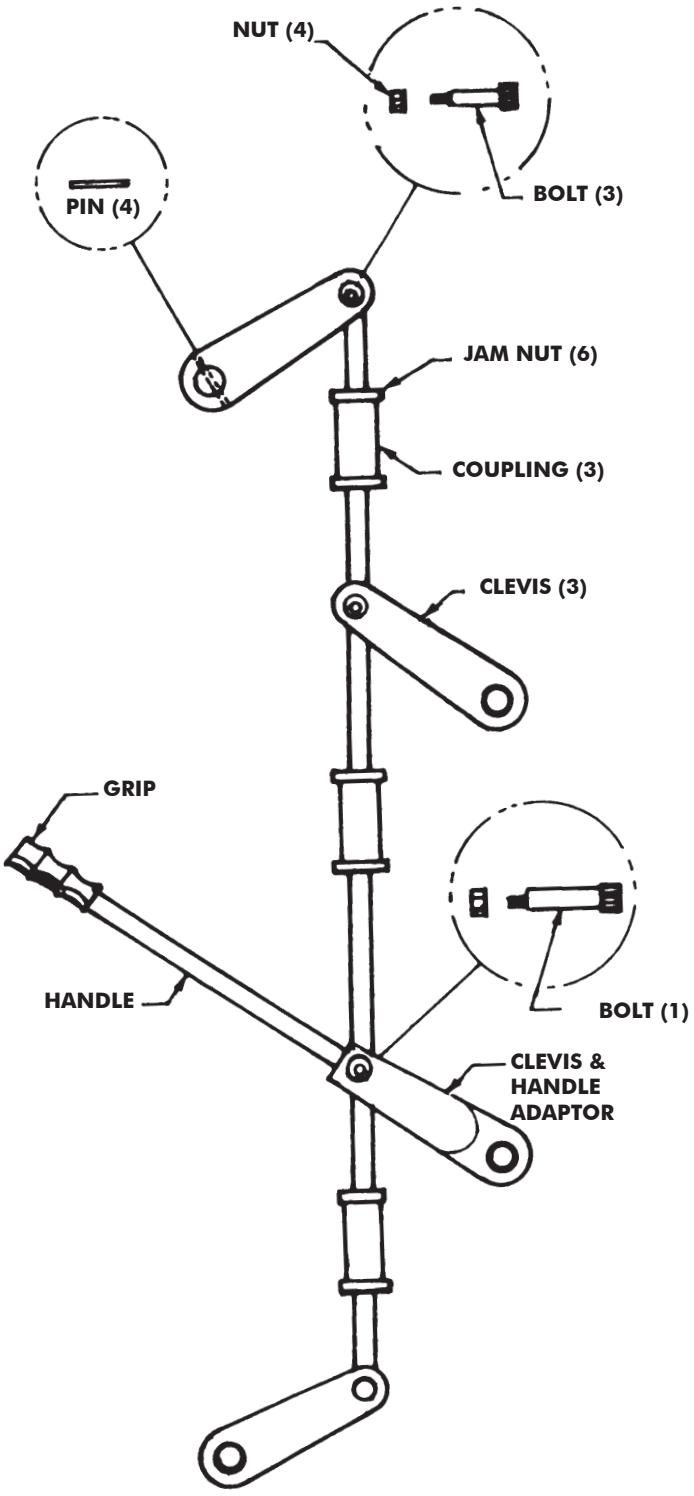
Procedure for Adjusting Linkage

All butterfly valves supplied with the system have a slot on the end of the stem or shaft indicating the position of the disc.

To adjust linkage, remove the respective clevis bearing, bolt and nut. Place the indicator mark in desired position. Loosen the respective jam nut. The linkage rod may now be extended or retracted into the adjustment coupling to the necessary length.

Replace the bearing, bolt and nut.

The assembly is now ready for operation.



LINKAGE ILLUSTRATION

HRL Linkage Assemblies

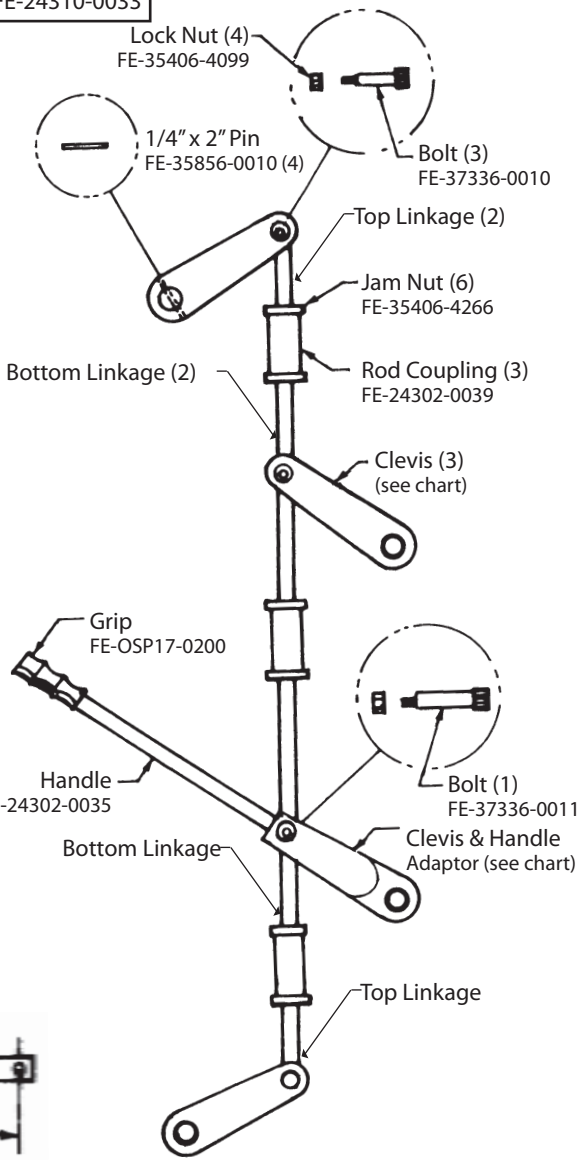
Single Tank Systems

Tank Diam.	Pipe Size	Clevis & Handle Adaptor	Clevis	Top Linkage	Bottom Linkage	Center Linkage
48″ - 66″	4″	L=5″	L=5″	L=3-3/4″	L=3-3/4″	L=11-1/4″
		FE-24306-0016	FE-24306-0024	FE-24303-0032	FE-24303-0034	FE-24303-0033
66″ - 96″	6″	L=5″	L=5″	L=5″	L=5″	L=9-1/4″
		FE-24306-0016	FE-24306-0024	FE-24309-0032	FE-24309-0034	FE-24309-0033
96″ - 120″	8″	L=5″	L=5″	L=5″	L=5″	L=10-1/2″
		FE-24303-0042	FE-24303-0044	FE-24309-0032	FE-24309-0034	FE-24310-0033

Dual Tank Systems

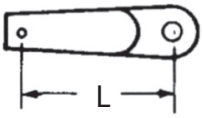
Tank Diam.	Pipe Size	Clevis & Handle Adaptor	Clevis	Top & Bottom Linkage	Center Linkage
48″ - 66″	6″	L=7-1/2″	L=7-1/2″	L=9-1/4″	L=17″
		FE-24303-0042	FE-24303-0043	FE-24305-0043	FE-24305-0044
72″ - 96″	8″	L=7-1/2″	L=7-1/2″	L=10-7/8″	L=20 - 1/4″
		FE-24309-0033	FE-24309-0045	FE-24307-0035	FE-24307-0036

Note: complete dual linkage assembly not pictured



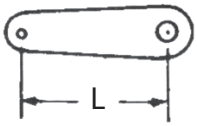
Top & Bottom Linkage

Clevis & Handle Adaptor



Center Linkage

Clevis



Dual Tank Linkage

Complete Linkage Assemblies

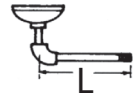
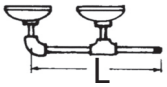
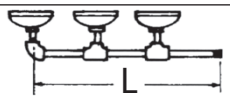
Linkage Assembly 4″ Face Piping Single Tank System	FE-LA004-0000
Linkage Assembly 6″ Face Piping Single Tank System	FE-LA006-0000
Linkage Assembly 8″ Face Piping Single Tank System	FE-LA008-0000
Linkage Assembly 6″ Face Piping Dual Tank System	FE-LAD06-0000
Linkage Assembly 8″ Face Piping Dual Tank System	FE-LAD08-0000

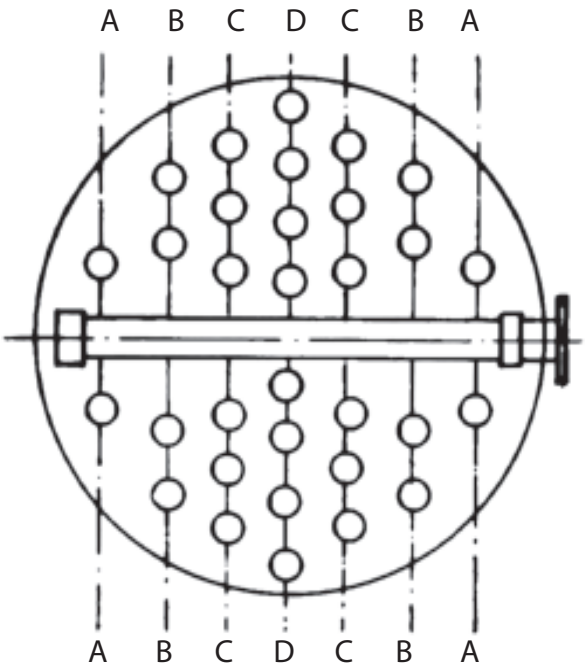
HRL & HRG Series
Replacement Diverters

Chart I

Tank Diam.	Qty. & Length	Diverter Assembly Required							
		A		B		C		D	
30″	Qty.	1							
	Length	15 - 5/16″							
36″	Qty.	1							
	Length	17″							
42″	Qty.	4							
	Length	8 - 5/16″							
48″	Qty.	4	2						
	Length	8 - 5/16″	15- 15/16″						
54″	Qty.	4		2					
	Length	12 - 15/16″		19″					
60″	Qty.	4		2					
	Length	12 - 15/16″		19″					
66″	Qty.	4	4	2					
	Length	8 - 5/16″	15-15/16″	25″					
72″	Qty.	4	4	2					
	Length	8 - 5/16″	15-15/16″	25″					
78″	Qty.	4	4	2					
	Length	8 - 5/16″	15-15/16″	25″					
84″	Qty.	4		4		2			
	Length	12 - 15/16″		25″		27 - 1/2″			
90″	Qty.	4		4		2			
	Length	15 - 15/16″		25″		27 - 1/2″			
96″	Qty.	4		4	4	2			
	Length	15 - 15/16″		25″	30″	37 - 1/2″			
102″	Qty.	4		4	4	2			
	Length	15 - 15/16″		25″	30″	37 - 1/2″			
108″	Qty.	4		4	4	2			
	Length	15 - 15/16″		25″	30″	37 - 1/2″			
120″	Qty.	4				4	4	2	
	Length	8 - 5/16″				27 - 1/2″	37 - 1/2″	47″	

Chart II

Part No.	"L" Length	Diverter Assembly
FE-24312-0039	8 - 5/16″	
FE-24312-0037	12 - 5/16″	
FE-24312-0035	15 - 5/16″	
FE-24312-0007	17″	
FE-24312-0033	19″	
FE-24312-0031	25″	
FE-24312-0029	30″	
FE-24312-0009	27 - 1/2″	
FE-24312-0007	37 - 1/2″	
FE-24314-0007	47″	



The above illustration is used to show relative types of diverter assemblies. Positions shown do not necessarily correspond to actual position in the filter.

Note:

Some columns indicate two A, B, or Cs. This is necessary because the type is the same, only the length is different.

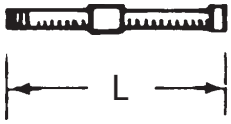
To determine correct part number when ordering, refer to Chart I. Find the size of your tank, then read across to the desired length. Refer to Chart II, "L" column for the corresponding length and read the part number immediately to the left in the Part Number column.

HRL & HRG Series
Replacement Laterals

Chart I

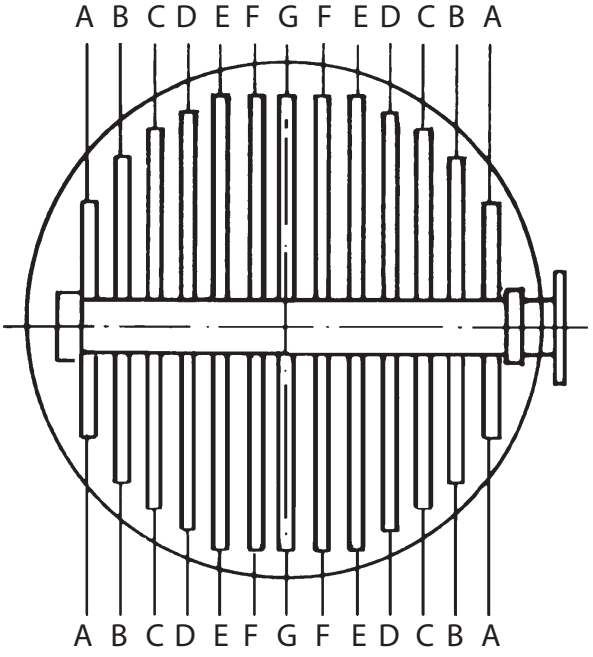
Tank Diam.	Qty. & Dash No.	Lateral Assembly Required						
		A	B	C	D	E	F	G
30″	Quantity						4	2
	Dash No.						-17	-16
36″	Quantity					4	4	
	Dash No.					-18	-19	
42″	Quantity					4	4	
	Dash No.					-18	-21	
*48″	Quantity					4	4	2
	Dash No.					-18	-18	-21
**48″	Quantity					4	4	2
	Dash No.					-31	-33	-34
54″	Quantity					4	4	2
	Dash No.					-31	-34	-35
60″	Quantity					4	4	2
	Dash No.					-31	-35	-36
66″	Quantity				4	4	4	2
	Dash No.				-32	-35	-36	-36
72″	Quantity				4	4	4	2
	Dash No.				-32	-36	-37	-37
78″	Quantity				4	4	4	2
	Dash No.				-32	-36	-38	-38
84″	Quantity			4	4	4	4	2
	Dash No.			-32	-36	-38	-39	-39
90″	Quantity			4	4	4	4	2
	Dash No.			-33	-36	-38	-41	-41
96″	Quantity			4	4	4	4	2
	Dash No.			-33	-37	-41	-42	-42
102″	Quantity			4	4	4	4	2
	Dash No.			-33	-38	-42	-43	-43
108″	Quantity		4	4	4	4	4	2
	Dash No.		-33	-37	-41	-43	-44	-44
120″	Quantity	4	4	4	4	4	4	2
	Dash No.	-34	-38	-43	-44	-45	-45	-45

Chart II

Part No.	"L" Length	Lateral Assembly
FE-24300-0016	12 - 1/4″	
FE-24300-0017	8 - 3/8″	
FE-24300-0018	9 - 3/4″	
FE-24300-0019	15″	
FE-24300-0021	17″	
FE-24300-0031	13″	
FE-24300-0032	15″	
FE-24300-0033	17″	
FE-24300-0034	21″	
FE-24300-0035	23″	
FE-24300-0036	25″	
FE-24300-0037	30″	
FE-24300-0038	33″	
FE-24300-0039	34″	
FE-24300-0041	38″	
FE-24300-0042	41″	
FE-24300-0043	43″	
FE-24300-0044	46″	
FE-24300-0045	51″	

Note:

To determine correct part number for ordering refer to the proper tank size, Chart I. Read across to the desired assembly and read the dash number under quantity. Refer to Chart II for dash number located in partnumber column. Lengths are given for reference along with illustration.



The illustration above shows a 120" diameter filter. Smaller diameter tanks have fewer assemblies.

Typical Daily Operation Log

Week Ending: _____

		Pressure	Pump Suction	pH	Free Chlorine ppm	Total Chlorine ppm	Total Alkalinity	Calcium Hardness	Backwash Time	Temperature		Flow Rate	Filter Run	Bathing Load
										Air	Water			
Sat.	A.M.													
	P.M.													
Sun	A.M.													
	P.M.													
Mon.	A.M.													
	P.M.													
Tues	A.M.													
	P.M.													
Wed.	A.M.													
	P.M.													
Thurs.	A.M.													
	P.M.													
Fri.	A.M.													
	P.M.													