

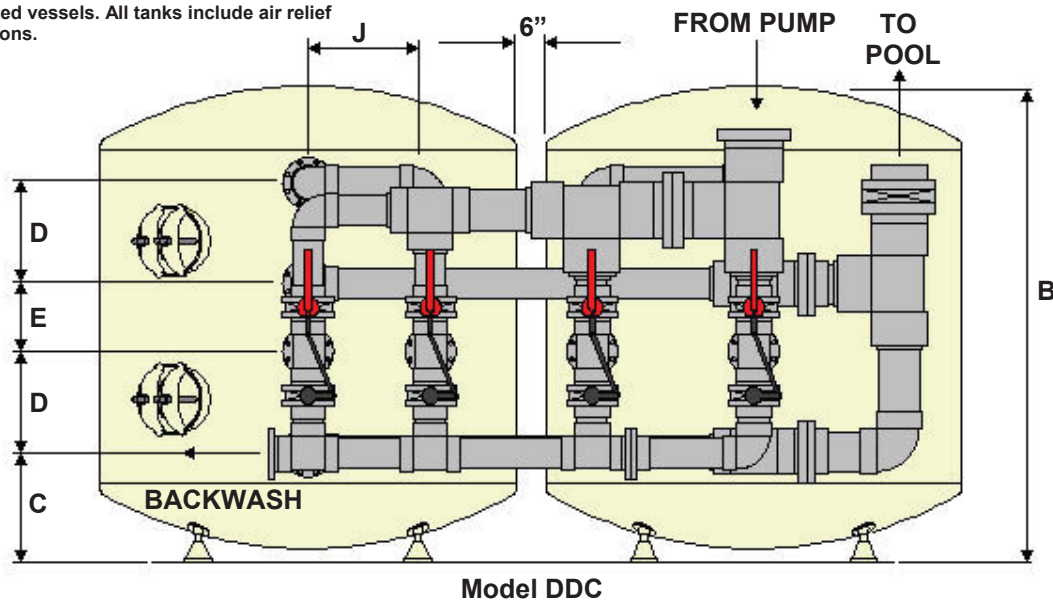
Tank Lining options:  
Standard Epoxy  
Flexsol 3000™

Tank Options:  
Carbon Steel  
Stainless Steel  
A.S.M.E.

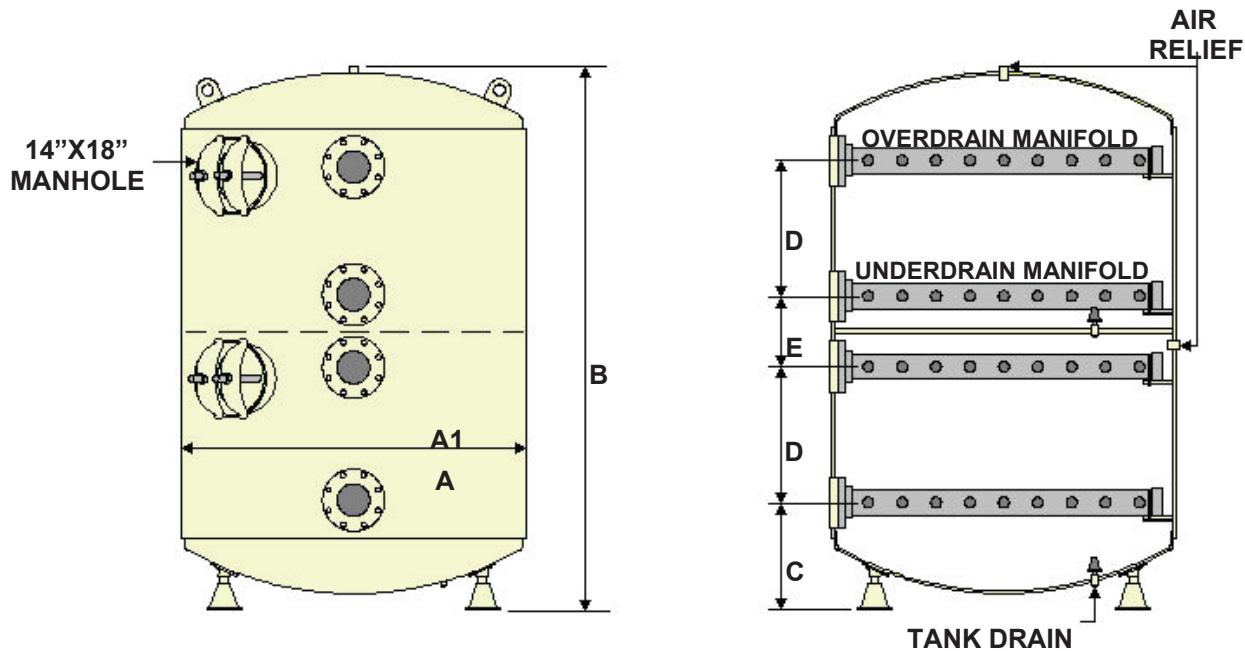
Note: Piping configuration as shown Available for 42" – 72" filters

All dimensions are in inches										
Face Piping Dimensions										
Dimensions	Face Piping Size									
	Single Tank				Dual Tank					
	3	4	6	8	4x3	6x4	6x6	8x6	10x6	10x8
H	-	-	-	-	26	31	41	41	41	54
J	19	22	28	37	21	26	30	33	39	42

Note: All dimensions are based on steel construction, 50 psi operating pressure and 75 psi hydrostatic test. Consult Neptune-Benson for dimensional verification on custom fabricated vessels. All tanks include air relief and drain connections.



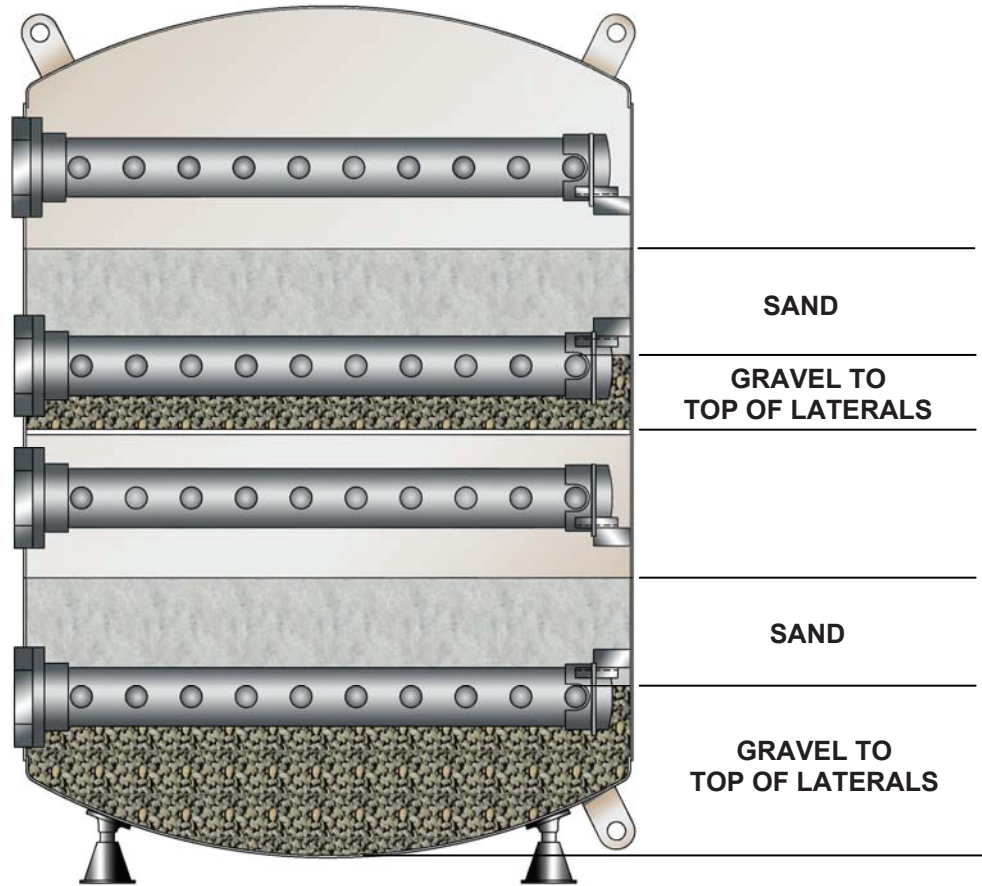
## Physical Capacity and Dimensional Information



Filter Model Number	Tank Conn	Filter Area (SF)	Flow Capacity (GPM)	Filter Rate (GPM/SF)	All dimensions are in inches								Tank Shipping Weight (LBS)	Operating Weight (LBS)
					A*	A1*	B	C	D	E	F*	G*		
42 SDC-4	3	19.2	96-384	5-20	42	42 3/8	90	16 1/16	24 3/4	11 1/2	3/16	3/16	1100	7689
48 SDC-3	3	25.1	126-402	5-16	48	48 3/8	92 1/2	16 13/16	24 3/4	11 1/2	3/16	3/16	1250	9821
48 SDC-4	4	25.1	403-502	17-20	48	48 3/8	92 1/2	17 13/16	23 3/4	12 1/2	3/16	3/16	1300	9821
54 SDC-3	3	31.8	159-382	5-12	54	54 3/8	94 3/8	17 13/16	24 3/4	11 1/2	1/4	3/16	1600	13144
54 SDC-4	4	31.8	383-636	13-20	54	54 3/8	94 3/8	18 13/16	23 3/4	12 1/2	1/4	3/16	1650	13144
60 SDC-4	4	39.3	197-786	5-20	60	60 3/8	95	18 5/8	23 3/4	12 1/2	1/4	3/16	1900	16068
66 SDC-4	4	47.5	238-713	5-15	66	66 1/2	96 1/2	19 3/8	23 3/4	12 1/2	1/4	1/4	2400	19262
66 SDC-6	6	47.5	714-956	16-20	66	66 1/2	96 1/2	20 3/8	21 3/4	14 1/2	1/4	1/4	2500	19262
72 SDC-4	4	56.5	283-678	5-12	72	72 1/2	98	20 3/16	23 3/4	12 1/2	1/4	1/4	2700	24000
72 SDC-6	6	56.5	679-1130	13-20	72	72 1/2	98	21 3/16	21 3/4	14 1/2	1/4	1/4	2800	24000
78 SDC-6	6	66.4	332-1328	5-20	78	78 1/2	100	22 1/8	21 3/4	14 1/2	5/16	1/4	3300	28653
84 SDC-6	6	77	385-1540	5-20	84	84 1/2	101 1/2	22 15/16	21 3/4	14 1/2	5/16	1/4	3700	31100
90 SDC-6	6	88.4	442-1768	5-20	90	90 1/2	103 1/8	23 3/4	21 3/4	14 1/2	5/16	1/4	4050	37797
96 SDC-6	6	100.5	503-1609	5-16	96	96 1/2	104 3/4	24 9/16	21 3/4	14 1/2	5/16	1/4	4500	42704
96 SDC-8	8	100.5	1609-2010	17-20	96	96 1/2	108 3/4	25 9/16	21 3/4	16 1/2	5/16	1/4	4750	42704
102 SDC-6	6	113.5	568-1589	5-14	102	102 5/8	106 5/8	25 1/2	21 3/4	14 1/2	3/8	5/16	5600	48587
102 SDC-8	8	113.5	1590-2270	15-20	102	102 5/8	106 5/8	26 1/2	21 3/4	16 1/2	3/8	5/16	5900	48587
108 SDC-6	6	127.2	636-1654	5-13	108	108 5/8	108 1/8	26 1/4	21 3/4	14 1/2	3/8	5/16	6150	57276
108 SDC-8	8	127.2	1655-2544	14-20	108	108 5/8	112 1/8	27 1/4	21 3/4	16 1/2	3/8	5/16	6500	57276
114 SDC-6	6	141.8	709-1702	5-12	114	114 5/8	109 3/4	27 1/16	21 3/4	14 1/2	3/8	5/16	6700	67082
114 SDC-8	8	141.8	1703-2836	13-20	114	114 5/8	113 3/4	28 1/16	21 3/4	16 1/2	3/8	5/16	7000	67082
120 SDC-6	6	157	785-1884	5-12	120	120 5/8	112 3/8	28 7/8	21 3/4	14 1/2	3/8	5/16	7300	71473
120 SDC-8	8	157	1885-3140	13-20	120	120 5/8	116 3/8	29 7/8	21 3/4	16 1/2	3/8	5/16	7600	71473

Note: Tabulated data represents standard non-ASME construction.  
 Consult Neptune-Benson for verification on ASME certified and custom fabricated vessels.  
 F\* = Head thickness; G\* = Shell thickness  
 A\* = Inside Diameter  
 A1\* = Outside Diameter





### STANDARD MEDIA CHART

All dimensions are in inches

Filter Model Number	Tank Conn	Gravel (CF)	Filter Sand (CF)	Gravel Depth	Sand
42 SDC-3	3	13	21	6	12
48 SDC-3	3	17	28	6	13
48 SDC-4	4	20	26	7	12
54 SDC-3	3	23	34	6	13
54 SDC-4	4	25	32	7	12
60 SDC-4	4	31	40	7	12
66 SDC-4	4	39	48	7	12
66 SDC-6	6	42	48	8	12
72 SDC-4	4	48	56	7	12
72 SDC-6	6	52	56	8	12
78 SDC-6	6	63	66	8	12
84 SDC-6	6	74	78	8	12
90 SDC-6	6	86	88	8	12
96 SDC-6	6	99	100	8	12
96 SDC-8	8	116	100	9	12
102 SDC-6	6	114	114	8	12
102 SDC-8	8	114	114	9	12
108 SDC-6	6	131	128	8	12
108 SDC-8	8	142	128	9	12
114 SDC-6	6	146	142	8	12
114 SDC-8	8	160	142	9	12
120 SDC-6	6	168	158	8	12
120 SDC-8	8	181	158	9	12

NOTE: Gravel depth for upper cell only, bottom cell gravel depth varies from tank to tank.



## **SECTION 13150 SWIMMING POOL FILTRATION, RECIRCULATION, CONTROL AND CHEMICAL EQUIPMENT**

### **INTENT**

- A. Purpose of the bid is to purchase and have installed a complete filtration and recirculation system for the swimming pool. It is intended to limit the bidding to a style of product and company that has a proven history and record of performance.
- B. Due to the specialized nature of certain components required for this project, these specifications, in some instances, refer to various components by trade or manufacturers name.
- C. Whenever a proprietary (trade) name is used within this Specification Section, it is used for informational purposes to describe a standard of required function, dimension, appearance and quality. References to materials by trade name, make or model number shall not be construed as limiting competition. All bidders are required to bid on the named manufacturer in the BASE BID. The Contractor may at his option, elect to bid using the products and/or services of alternate manufacturers listed as **ALTERNATES ON THE BID FORM**.

### **ALTERNATES**

- A. Other treatment systems will be considered only if a complete set of drawings and specifications detailing such equipment as it pertains to this project are submitted for evaluation ten (10) days prior to the bid date. The submission should include a list of five (5) operating installations within a reasonable distance of the jobsite. List should include the names and telephone numbers of the operating personnel. The technical contents of the submittal shall include hydraulic calculations, equipment fabrication details, filter room layout in plan and elevation views, warranties, installation and operating instructions.

**NOTE: This information must be submitted by a bidding contractor. Submittals will not be considered if provided directly by the alternate equipment manufacturer.**

- B. Alternates meeting the terms and conditions of the bidding documents will be acknowledged prior to bidding by addendum. No alternates will be considered after the bid.
- C. For any and all alternates approved in accordance with the above conditions, state the amount to be DEDUCTED from the BASE BID if an alternate filtration system is being offered. No provision has been or will be made for ADDITIVE bids.

### **SUBSTITUTIONS**

- A. No substitutions will be considered unless the specified product becomes unavailable due to no fault of the Contractor.

## **QUALITY ASSURANCE**

- A. Due to the specialized nature of the specified work and products, all bidders shall be required to have a minimum of five (5) years of operating history. The equipment described herein shall be products of a manufacturer regularly engaged in the fabrication of filtration and recirculating systems for at least fifteen (15) years and shall be a professional engineering corporation.
- B. The owner requires that filters bear the National Sanitation Foundation (NSF) seal for Standard #50. This NSF listing is required by the owner regardless of local health department regulations.
- C. The specified filter system shall have had an NSF listing for at least two (2) years prior to the project bid date.
- D. As assurance that each item of apparatus is properly sized to perform in conjunction with each other, the owner requires bidders to use the filter manufacturer as a single source of supply for the items of equipment as listed and described herewith.
- E. For projects that incorporate stainless steel gutter systems, the filter system and stainless steel gutter system shall be manufactured and supplied by the same company.
- F. The "EQUIPMENT SUPPLIER" shall be:

NEPTUNE-BENSON, INC.  
COVENTRY, RHODE ISLAND  
1-800-832-8002

## **GUARANTEE**

- A. The "EQUIPMENT SUPPLIER" shall guarantee that the equipment to be furnished is of the correct capacity, that the various parts are designed to operate correctly and in conjunction with each other, that if the installation is made in accordance with the project drawings and operated in accordance with the suppliers instructions, the system will perform the prescribed functions correctly, the water entering the pool will be clear, bright, free from suspended matter visible to the unaided eye, and will be sanitary to the satisfaction of all authorities having jurisdiction.

## **SUBMITTALS**

- A. Provide detailed shop drawings of the items of equipment being provided, indicating the dimensions, material of the filter tanks, exterior face piping, internal manifolds and laterals and filter media.
- B. Provide a complete set of operating instructions, embracing the operational functions and recurring maintenance processes involved in connection with the complete filtration system.

## **PART 2 - FILTER SYSTEM**

### **FILTER SYSTEM REQUIREMENTS**

1. The system shall be supplied complete by the manufacturer and shall include: internals, face piping and valves, gauge panel with tubing and petcocks, sight glass, air relief connection, bottom drain connection with internal strainer.
2. System shall be fabricated and fully assembled at the manufacturer's plant for pressure testing and dimensional verification. System shall be knocked down for shipping purposes in subassemblies for minimum field assembly. Internal manifold and lateral piping shall be factory installed and shipped in place.

### **FILTER SYSTEM CAPACITY**

- A. The system capacity, size, performance and model number shall be as shown on the drawings.

### **MULTI-CELL FILTER TANK**

- A. The filter tank shall be suitable for 50 psi working pressure and hydrostatically tested to 75 psi. The inner separating partition(s) between cells shall be no less than ½" thick. All material to be high quality Type A-36 carbon steel or better.
- B. All welding shall be performed by qualified operators. Joints shall be butt or fillet welded by manual or automatic process. Welded joints shall have complete penetration and fusion with little or no reduction of the thickness of the base metal. Welds shall be free of coarse ripples, grooves, overlaps, abrupt ridges or valleys. All welded surfaces shall be chipped and brushed clean, when necessary, leaving no slag or splatter.
- C. Drain out system shall consist of a ¾" T304 stainless steel couplings mounted to each partition and in the bottom head. Each coupling to be fitted with a slotted PVC sand retainer inside each cell. Each cell shall be provided with a ¾" T304 stainless steel coupling for air relief connections.
- D. Adjustable jack legs shall be used to support the filter tank. Access to each cell shall be provided by a 14" x 18" manhole with two (2) cast or forged curved yokes. Manhole seal shall be complete with one piece ¼" neoprene gasket and positioned so that internal pressure from filter will augment the seal. No additional hardware or thru bolts will be allowed.
- E. Each filter cell shall be equipped with the necessary flanges and connections for the internal and external piping. All tank connections 2" and under shall be 150 lb. Type T304 stainless steel threaded full couplings. All tank connections 3" and over, shall be heavy steel bosses drilled and tapped both sides to receive standard flanged fittings.
- F. Tank shall be equipped with a UL listed grounding lug.

## **FLEXSOL 3000® INTERIOR LINING**

- A. All interior surfaces shall be grit blasted to white metal condition with a 3-4 mil profile. Blasted surfaces shall be cleaned of all dust or blast residue. Lining shall be applied as soon as is practical on the same day blasting is done.
- B. Flexsol 3000® shall be a urethane, 100% solid plural component lining. Hardness shall be 75 durometer on the shore D scale. Break tensile strength shall be 4000 psi with elongation of less than 10%. Adhesion shall be greater than 2500 psi.
- C. Application of Flexsol 3000® lining shall be done by experienced applicators using a high pressure, high temperature plural component system. All wetted surfaces including flange faces, manway rings and manway covers shall be lined to 100 mils +/- 10 mils WFT.
- D. Hardness shall be verified after curing to ASTM D 2240 standard.
- E. Manufacturer shall submit for approval a sample piece of coated steel to determine flexibility, abrasion tolerance and adhesion integrity.
- F. Flexsol 3000® lining shall meet the NSF toxicity standard unconditionally and shall be approved for use with the NSF approved filter.
- G. Flexsol 3000® lined vessels shall carry a ten (10) year limited non-prorated warranty.
- H. The filter manufacturer shall bear the responsibility for suitability of lining and shall be the sole source for the specified warranty.

## **EXTERIOR COATING**

- A. Prepared steel surfaces shall be free of weld spatter and fabrication contaminants. Steel surfaces shall be solvent washed and wired brushed to assure complete grease/oil removal.
- B. One coat of a high solid epoxy with cross-link polymerization cure shall be applied for a total developed film thickness of 4-6 mils.
- C. This factory-applied coating is a base coat only. Manufacturer to supply a min. 32 oz. can of touch-up paint. Manufacturer recommends exterior coating of filter tanks with suitable epoxy. (To be supplied and applied by contractor or others).

## **FILTER PIPING - INTERNAL (VERTICAL STEEL/FIBERGLASS TANKS)**

- A. The internal distribution system shall be a horizontal header/lateral arrangement. The header shall be Schedule 80 PVC construction, capped on one end and flanged on the other end. Lateral connections shall be spaced no more than 6" on the centers and shall be 1½" FPT connections.

- B. Underdrain laterals shall consist of 1½" Schedule 80 PVC pipe with .012" wide machined double slotted openings on 1/8" centers. Machined openings shall be designed to retain all media particles as small as .30 mm particle size. Molded or drilled openings or retainer screens will not be acceptable. Each lateral shall be fabricated complete with a socket cap on one end and male adapter on the other. Both fittings to be solvent welded to the slotted pipe. Laterals shall be designed and sized at the factory so as to be installed in the field and cover the entire cross sectional area of the filter. Laterals shall be fitted with a rubber O-ring to allow for proper positioning of the machined openings.
- C. Overdrain laterals shall consist of 1½" Schedule 80 PVC pipe with 1/2" wide machined slotted openings on 1 1/4" centers for filter tanks sizes up to 60". Filter tanks 66" up to 120" shall consist of 1½" Schedule 80 PVC pipe with 1/4" wide machine slotted openings on 1 1/4" centers. Overdrain laterals shall be designed and sized at the factory so as to provide uniform distribution and unrestricted flow during filter and backwash cycles.
- D. All hardware in wetted areas shall be stainless steel or non-metallic.

## **FACE PIPING**

- A. External face piping shall be Schedule 80 PVC pipe and fittings. Flanges shall be located so as to allow for easy dismantling of face piping. All fittings shall be solvent cemented.
- B. Piping shall be drilled and tapped where necessary to accommodate gauge tubing connectors.
- C. All valves 3" – 12" shall be constructed with cast aluminum ASTM S12A housing and fully coated with Rilsan on all interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and T304 stainless steel shaft. Valves 14" and larger shall be constructed with cast iron housing epoxy coated and with nylon coated ductile iron disc.
- D. Standard accessory items shall include sight glass rated for 50 psi with polycarbonate glass, remote mounted gauge panel with two 4½" diameter pressure gauges, ¼" petcocks, ¼" poly vent tubing with PVC compression adapters.
- E. Face piping shall be fully factory assembled, knocked down and crated for shipment. The warranty of the face piping shall be provided by the filter manufacturer. Field gluing or assembly of the face piping by anyone other than the filter manufacturer will not be accepted.
- F. Face piping arrangement shall be as indicated on the drawings.

## **AUTOMATIC AIR RELIEF VALVE**

- A. 1" valve shall be provided to automatically and continuously release air in the filter. The valve shall be fabricated of plastic with Buna-N seals. A plumbing kit shall be provided with two (2) PVC ball valves to allow manual air relief and isolation of the automatic valve. Valves fabricated of cast iron, bronze or stainless steel shall not be acceptable



## **SINGLE LEVER LINKAGE**

- A. A clevis and rod linkage shall connect the four butterfly valves provided with the face piping. Assembly shall be designed so that filter and backwash cycles can be accomplished by simply raising or lowering the operating handle.
- B. Connecting pieces shall vary with size of face piping in order to operate with suitable mechanical advantage.
- C. All linkage parts shall be T304 stainless steel.
- D. Linkage shall be designed so that all valves operate simultaneously eliminating the possibility of water hammer action. Each valve shall be adjustable to provide for accurate positioning and tight shut off.
- E. All linkage components shall be grit blasted to a 1.2 mil profile. Blast media shall be completely non-ferric.
- F. All linkage components shall be finish coated with 3-4 mils DFT of Type 316 pigmented stainless steel paint.

## **SLM ACTUATOR**

- A. An electromechanical actuator shall activate the single lever linkage. Actuator shall consist of 115 volt AC totally enclosed motor attached to a worm drive and 1½" diameter telescoping tube with 12" stroke length. Cycle time shall be fifteen (15) seconds with a load capacity of five hundred (500) pounds. Unit shall be complete with built-in, adjustable limit switches and clevis end fittings.
- B. Actuator shall be factory wired with a 10' cable with molded connector. Cable shall be type STD #16 AWF 6 conductor rated for 600 v/8 amps.
- C. Cable shall be moisture, oil and dirt resistant with threaded male connector providing strain relief low risk for wire breakage and connection integrity.

## **THREE (3)-WAY VALVE CONTROL ASSEMBLY**

- A. A mechanical linkage shall connect two (2) valves in order to create simultaneous movement.
- B. Connecting pieces shall vary with the size of face piping in order to operate with suitable mechanical advantage.
- C. All linkage parts shall be T304 stainless steel.

- D. Linkage shall be designed so that filter and backwash cycles can be accomplished by repositioning a pair of valves.
- E. Each pair of valves shall be operated as specified with lever, gear or electric actuation.
- F. All linkage components shall be grit blasted to a 1-2 mil profile. Blast media shall be completely non-ferric.
- G. All linkage components shall be finish coated with 3-4 mils DFT of Type 316 pigmented stainless steel paint.

## **VALVE OPERATORS**

### **LEVER OPERATORS DOMINION™**

- A. Valves shall be provided with 6 position latch lock handles.
- B. Latch lock handles shall be constructed of epoxy coated cast aluminum and shall include a spring loader lever for position lock.
- C. Lever shall be capable of holding the disc in any of the locking positions with no movement up to the full pressure rating of the valve.

### **GEAR OPERATORS**

- A. Valves shall be provided with infinite position gear operators.
- B. Gear case (body) shall be constructed of cast iron painted internally and externally for maximum protection.
- C. Enclosure shall be sealed to IP65 and maintenance free.
- D. Self locking gearing shall be capable of holding the disc in any position with no movement up the full pressure rating of the valve.
- E. Gear operator shall provide 90° of travel with  $\pm 5^\circ$  adjustment in closed position.
- F. Gear operator shall include a non-corrosive sealed indicator for remote visibility.
- G. Gear operator shall include manual adjustment capabilities.

### **MODEL MFP 2 AUTOMATIC CONTROLLER**

- A. The controller shall govern the operation of the filter system by means of a programmable logic controller. All power to the controller and valves shall be 120 VAC or 230 VAC – single phase.
- B. The controller shall be housed in a Nema 4X fiberglass polyester enclosure with padlockable stainless steel snap latch hinges.
- C. The controller shall include a 4-row x 24 character LCD display with a 16 button numeric tactile feedback keypad and programmable function keys with LED's. The unit shall display system operation and status functions.
- D. The controller shall include (5) miniature plug-in double pole/double throw (DPDT) relays and (4) quick disconnect fuse holders fully integrated to manage the system functions.
- E. A pressure switch shall be installed to sense and signal for backwash actuation based on a preset pressure drop.
- F. ½" strain relief connections shall be provided in the bottom of the enclosure for all of the necessary input connections.
- G. The Model MFP 2 Controller shall provide the following operational features:
  - 1. Manual backwash initiation
  - 2. Automatic backwash initiation (pressure and/or time options)
  - 3. Timer for time clock backwashing
  - 4. Fixed backwash duration and delay features
  - 5. Real time clock with battery backup of data entry to maintain time during power failure.
  - 6. Capable of controlling up to (4) filters and (1) one priority valve
- H. All controller programming shall be accomplished using on-screen instructions.

## **ELECTRIC OPERATORS**

- A. Electric service shall be 110 VAC.
- B. Operator housing shall be corrosion resistant NEMA 4X (IP65).
- C. Electrical connectors shall be four-pole industrial style and meet DIN 43650 standards. Plug connection shall be gasketed and mechanically secured with a stainless steel screw. Harness assemblies from operator to control panel shall be factory fabricated. No field wiring shall be required.

- D. Drive assembly shall include hardened steel and polyamide reduction gears with permanent lubrication.
- E. Operator shall be equipped with a manual override.
- F. Operator shall have a visual position indicator.
- G. Electric drive motor minimum duty cycle rating to be 35%. Overloading protection shall be self-resetting.
- H. Limit switches shall be provided to allow adjustment of cycle.
- I. Two additional limit switch contacts shall be provided for indication or auxiliary.

### **PNEUMATIC OPERATORS**

- A. The actuators shall be double acting with valve mounted drilling to ISO 5211.
- B. The actuators shall include (2) 1/4" FPT ports for open / close connections. Flow control valves with quick connect fittings shall be provided at each port to allow speed control adjustment for the open / close function of the actuators.
- C. Materials of Construction
  - 1. Body: aluminum alloy, extruded acc. to ASTM 6063, anodized acc. To UNI 4522
  - 2. Ends: Die-cast in aluminum alloy acc. To ASTM B179, epoxy-polyester coated
  - 3. Pistons: Die-cast in aluminum alloy acc. To ASTM B179
  
  - 4. Pinion: Nickel-plated steel
  - 5. Slideways: Acetal resin (LAT LUB 731320T)
  - 6. Fasteners: AISI 304 Stainless steel
  - 7. Springs: Epoxy coated steel, pre-compressed
  - 8. Seals: NBR Nitrile rubber
  - 9. Lubricant: MoS2
- D. The actuators shall be factory lubricated to allow for 1,000,000 maneuvers.
- E. The actuators shall have adjustable travel stops for both directions.
- F. Working temperature limits: 4°F to 186°F.
- H. A tool kit for adjustment of pneumatic actuators shall be provided by the filter manufacturer.

## **FILTER / REGULATOR**

- A. Each filter shall include a combination filter / regulator. The regulator shall be adjustable from 0 – 120 p.s.i. 1/2” F.P.T. connections shall be provided for field installation of air lines.

## **WATER SEPARATOR**

- A. One water separator with automatic drain shall be included for each air compressor supplied. 1/2” F.P.T. connections shall be provided for field installation of air lines.

## **AIR COMPRESSOR**

- A. The system will require (1) air compressor per mechanical room. The following is the minimum requirement: 30 gallon tank, 2 HP 120v, 1 phase, 15 amp, 5.5 CFM @ 90 psi, air pressure gauge, pressure relief valve, belt guard, pressure switch, air filter

## **SOLENOID VALVES**

- A. Each filter shall include the required number of single solenoid, 4-way valves mounted on a multi-station manifold for operation of the pneumatic actuators.
- B. The solenoids valves shall include lighted DIN connectors.
- C. The solenoid valves shall be factory lubricated and shall not require any field lubrication.
- D. The solenoid valves with multi-station manifold shall be located on the gauge panel, factory wired and include quick connect fittings for attachment to the pneumatic actuators.
- E. The solenoid valves shall be SMC Series SY 7000.

## **MEDIA**

- A. Gravel support media of a hard coarse aggregate with a subangular grain shape with a particle size of 1/8" x 1/4" shall be used on the inside of the bottom head to the elevation where the filter media commences. The specific gravity shall not be less than 2.5. Support media shall be placed by hand to avoid damage to the underdrain system and leveled before the addition of the upper layer of filter media. Concrete underfill is not recommended. Support gravel shall be delivered and stored in 100 pound bags (approximately one cubic foot) for ease of handling and elimination of possible contamination. Media shall be free from minerals which may precipitate onto pool surfaces.
- B. Sand shall be a carefully selected grade of hard, uniformly graded silica material. Media shall be naturally rounded particles of silica or milled angularly shaped particles of silica quartz. Sand shall have a particle size between .45mm and .55 mm.(#20). No more than 1.5% shall be allowed to pass through a #40 sieve (.0164”). Uniformity coefficient shall not exceed 1.53. Specific gravity to be

not less than 2.5. Filter shall contain a minimum bed depth as shown on the drawings. Systems which do not provide a minimum bed depth as shown on the drawings will not be acceptable. Sand shall be delivered and stored in 100 pound bags (approximately one cubic foot) for ease of handling and elimination of possible contamination. Media shall be free from minerals which may precipitate onto pool surfaces.

C. Each filter tank shall be provided with media quantities as shown on the drawings

### **FILTER SYSTEM PACKAGING**

- A. All filter piping and valves shall be factory assembled and knocked down into sub-assemblies for shipment.
- B. The components shall be carefully packaged in a totally enclosed wooden crate to prevent damage during transport.

### **PART 4 – WARRANTIES**

#### **FILTER**

- A. Filter tanks shall carry a 10 year fully rated warranty as regularly offered by the tank manufacturer.
- B. Internal and external face piping shall carry a fully rated 3 year warranty.

#### **VALVES**

- A. Valve bodies shall carry a 5 year fully rated warranty.
- B. Valve operators shall carry one (1) year warranty as provided by the product manufacturer.

#### **SYSTEM ACCESSORIES**

- A. System accessories including sight glass, pressure gauges, pumps and air relief valve shall carry one (1) year warranty as provided by the product manufacturer.