

LAB COOLING WATER

CHILLED WATER IS CIRCULATED ABOUT THE ROOM FROM A NESLAB IN THE CORNER WHICH TRANSFERS HEAT INTO THE CAMPUS CHILLED WATER LOOP.

IF WATER FLOW IN OUR LOCAL LOOP IS INTERRUPTED THE FOLLOWING WILL OCCUR.

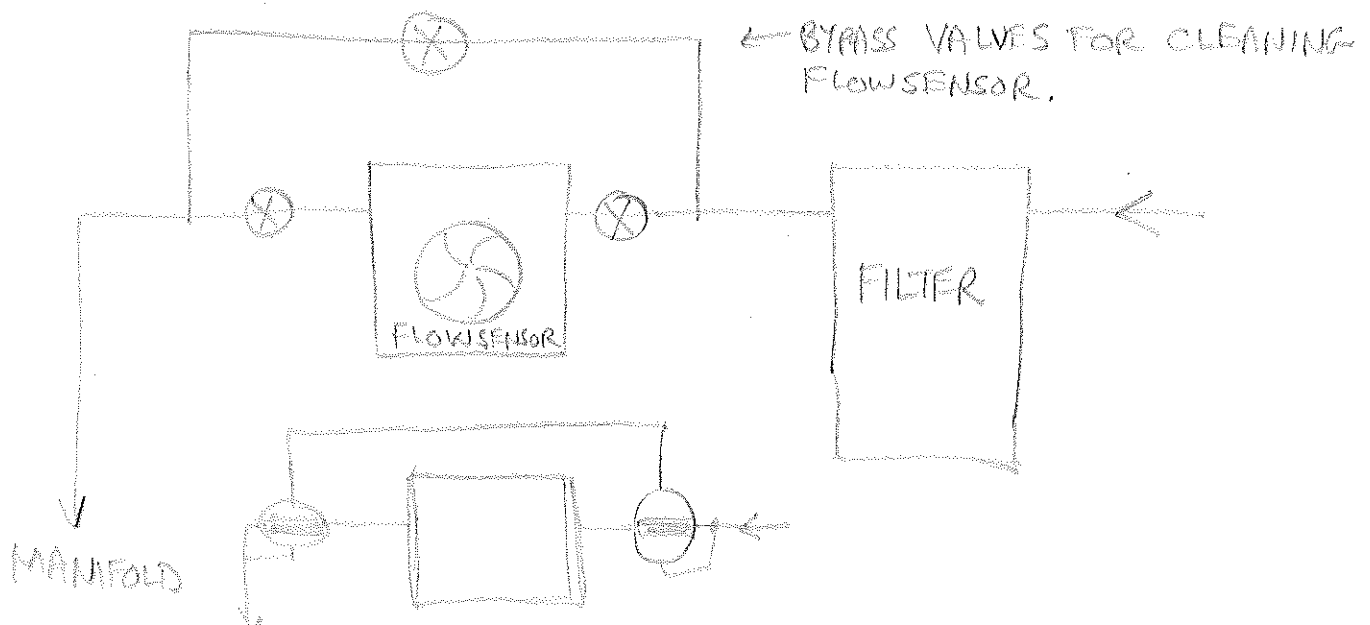
- 1) THE CRYOPUMP COMPRESSOR WILL OVERHEAT & SHUTDOWN (~ 3 MINUTES)
- 2) TURBO PUMPS WILL OVERHEAT & SHUTDOWN (10-15 MINUTES)
- 3) XRAY SOURCE ELECTRON GUN WILL OVERHEAT (NO SAFETIES)
- 4) ANODE COOLING SYSTEM (MFW) WILL WARM UP (NO SAFETIES)

~~COOLING WATER~~

A COOLING WATER INTERRUPTION OF > 15 SEC SHOULD SHUT DOWN THE ENTIRE XPS INSTRUMENT.

A FLOW SENSOR IS NEEDED AT THE OVERHEAD BEAMLINE

MANIFOLD FOR THE M-PROBE. (THIS WOULD NOT INCLUDE ANY OTHER EQUIPMENT INSTALLED ELSEWHERE IN THE TUNNEL)





CABLE: "NESLAB"
FAX (603) 436-8411

7/1/91

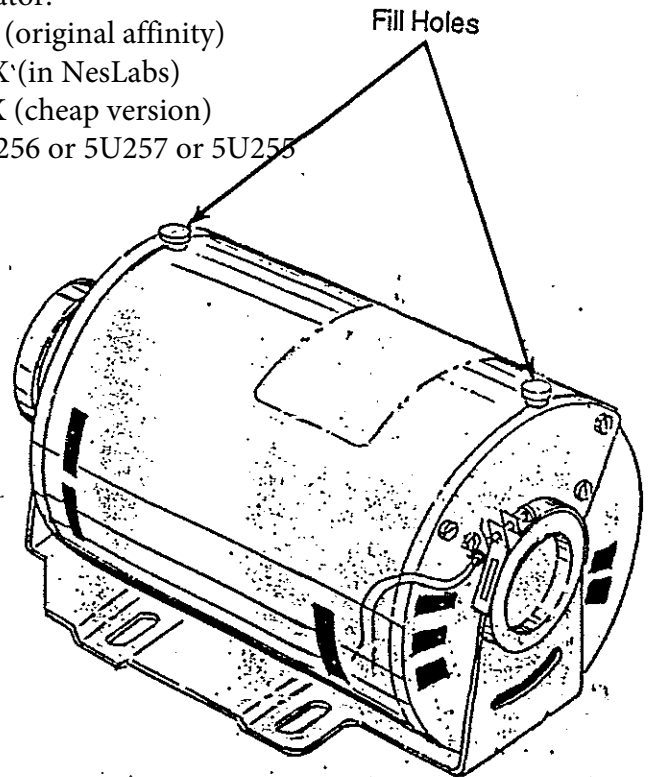
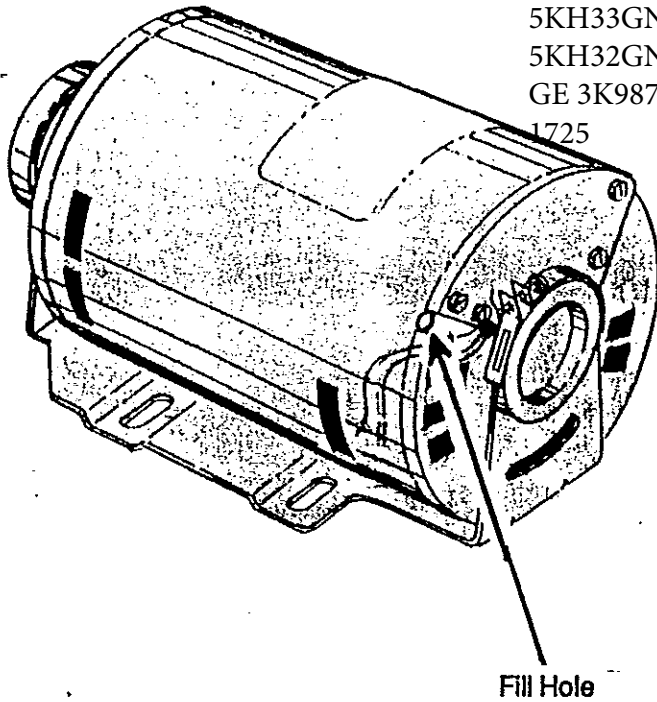
NESLAB Instruments, Inc.

Temperature Controlled Liquid Systems

P.O. Box 1178, Portsmouth, NH 03802-1178 U.S.A. ■ 25 Nimble Hill Road, Newington, NH 03801 U.S.A. ■ (603) 436-9444

PD-1, PD-2 PUMP MOTOR LUBRICATION

Pump Motors for affinity:
Marthon carbónator:
5KH32FN5598X (original affinity)
5KH33GNA444X (in NesLabs)
5KH32GNB811X (cheap version)
GE 3K987 or 5U256 or 5U257 or 5U255
1725



Units with PD-1 and PD-2 pumps require pump motor lubrication. Refer to the pump identification label on the rear of the unit to identify the specific pump in your unit.

Motors used to drive the pump are manufactured by several companies. These motors have sleeve type bearings with large oil reservoirs. Oiling instructions are generally posted on each motor. In the absence of legible lubrication instructions, add approximately 30 to 35 drops of SAE 20 non-detergent oil to each bearing on the following schedule (SAE 20 = 142 CS viscosity):

Duty Cycle	Oiling Frequency
Continuous	Each year
Intermittent	Each 2 years
Occasional	Each 5 years

November 11, 1998

Repair of the Neslab Coolflow System II

Videl from McCullum Air inc. (office phone (626) 795-6380; worked from 7:30 AM to 1:45 PM) disconnected the system from the wall plumbing, removed the bad motor and attached pump and replaced it with the motor and pump from the "extra" leaky Neslab System II Alan had obtained from somewhere. The motor did not start initially, but after some coaxing did, but became hot almost immediately. Oil was added and the pump restarted. The motor did not become as warm, but was still very warm. Videl removed the pump and replaced it with one originally in the unit because that one turned more easily. The motor again needed some coaxing to get it to start, and once started became very hot. Tony from the Biology refrigeration repair shop says this can be normal with this type of motor. The Neslab was left running to see if it would overheat. Meanwhile a new motor was ordered through Tony to replace the bad motor.

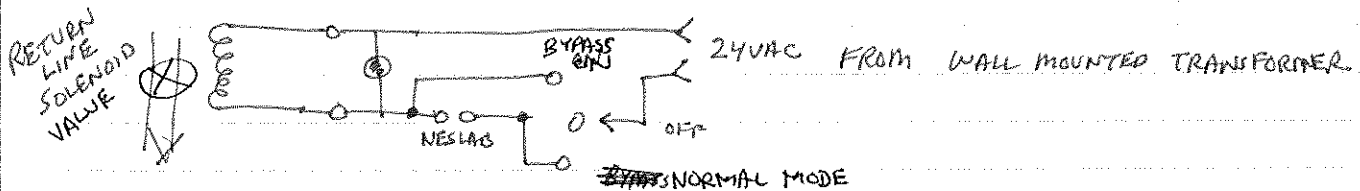
ROOM COOLING Loop

NESLAB POWER-FAIL SHUTDOWN.

6-95

NESLAB RECIRCULATOR PUTS COLD WATER INTO OVERHEAD PIPES FOR COOLING LAB EQUIPMENT. WHEN THE NESLAB SHUTSDOWN THIS OVERHEAD WATER DRAINS BACK INTO THE NESLAB TANK CAUSING IT TO OVERFLOW.

A CHECK VALVE HAS BEEN PLACED IN THE "UP" PIPE (SUPPLY-SIDE). AN ELECTRIC SOLENOID VALVE HAS BEEN PLACED IN THE "DOWN" RUN (RETURN SIDE). THE CIRCUIT BELOW CLOSES THIS SOLENOID VALVE WHEN THE NESLAB SHUTS OFF.



7-9-96

"POWER OFF LATCH"

9-96

NESLAB MODIFICATION

AS ORIGINALLY WIRED, THE NESLAB WOULD LATCH ~~ON~~ ^{OFF} FOLLOWING A POWER FAILURE. IT HAS BEEN MODIFIED TO RESTART WHEN POWER RETURNS. THIS WAS DONE AT THE TERMINALS OF THE FRONT PANEL POWER ON/OFF TOGGLE SWITCH. THE SWITCH HAS TWO INDEPENDENT CIRCUITS. CIRCUIT "ONE" (INBOARD) IS MAIN POWER ON/OFF. CIRCUIT "TWO" (OUTBOARD) WAS THE MOMENTARY CONTACT USED FOR INITIAL ~~ON~~ ACTIVATION OF THE POWER-ON LATCH. THE TWO LEADS ~~W~~ ATTACHED TO SWITCH CIRCUIT "TWO" WERE SIMPLY TIED TOGETHER BY MOVING THE BLACK LEAD UP TO JOIN THE YELLOW AT THE UPPER TERMINAL. CAUTION - THIS PROBABLY DISABLES THE SAFETY CIRCUITS, SUCH AS, LOW WATER.

NESLAB BI 023

IN-ROOM RECIRCULATOR

PUMP SHUTDOWN - CAUSED

1/95 OVERFLOW OF RESERVOIR ONTO FLOOR. REPLACED MOST OF THE WATER IN SYSTEM W/ DI WATER.

3/95 REPLACED EXTERNAL GREEN GARDEN HOSES.

INSTALLED SOLENOID VALVE ON ^{INSTRUMENT} NO WATER RETURN LINE AND ONE-WAY CHECK VALVE ON INSTRUMENT SUPPLY SIDE, INTERLOCK TO NESLAB OPERATION. WHEN NESLAB TURNS OFF THE SOLENOID WILL CLOSE TRAPPING WATER IN OVERHEAD PLUMBING.

WATER IS TRAPPED IN THE OVERHEAD PLUMBING WHEN THE NESLAB TURNS OFF FOR ANY REASON. THERE IS A CHECK VALVE ON THE SUPPLY SIDE (GOING UP) AND AN ELECTRIC SOLENOID VALVE ON THE RETURN SIDE (LINE COMING DOWN). THESE VALVES SHOULD KEEP THE NESLAB RESERVOIR FROM OVERFLOWING DURING A POWER OUTAGE.

7-1-95 QUALITY OF WATER $\approx 77 \mu S$. FLUSHED DI ($C = 0.0 \mu S$) THROUGH SYSTEM. AFTER FLUSH $C \sim 5-10 \mu S$. ADDED 10 mL OF VWR CLEAR BATH ALGECIDE TO REDUCE GROWTH INSIDE CLEAR PLASTIC HOSES. CONDUCTIVITY MEASURED WITH H_2O PURE HAND HELD DIPPER UNIT IN TOOLBOX.

5-8-96 CONDUCTIVITY WAS $40 \mu S$. FLUSHED SYSTEM WITH DI HOUSE WATER TO $C \sim 3 \mu S$. (MISTAKE - OPENED CROSS CONNECTS OVERHEAD BETWEEN SUPPLY & RETURN INTRODUCING LARGE PIECES OF BROWN SCALE INTO SYSTEM. NOT GOOD FOR TURBO PUMP COOLING LINES.) ADDED 20ml ALGECIDE (ALSO CAUSES FOAMING AND STRANGE SURFACE TENSION PROPERTIES ON WETTED SURFACES)

"OMNIFILTER!"

5-16-96 ADDED BABY BLUE PARTICLE FILTER OVERHEAD AT XPS FEEDPOINT. 25 μ CARTRIDGE INSTALLED. CARTRIDGES ARE STANDARD 9 $\frac{3}{4}$ " ELEMENTS (AVAILABLE FROM McMASTER-CARR). 20 μ PAPER FILTER

6-10-96 TOTAL FLOW TO M-PROBE ~ 2.4 gal/min.

7-10-96 OILED BOTH ELECTRIC PUMP MOTORS. 15-20 DROPS OF SAE 10 @ EACH BEARING. OMNIFILTER ELEMENT WAS OLIVE-GREEN; REPLACED. BEWARE OF WATERFALL ON OPENING FILTER CANNISTER.

[CLOSING THE WALL MOUNTED RETURN LINE SOLENOID LINE CAN IMPROVE FLUSHING BY NOT RECIRCULATING OLD WATER]

4-9-97 REPLACE OMNIFILTER ELEMENT [OLD ONE WAS QUITE GREEN & ALIVE]. HI CAPACITY PLEATED PAPER (20μM) ELEMENT INSTALLED, WATER SAMPLED FROM WEST SIDE SYSTEM DRAIN WAS 91μS. TOTAL FLOW WAS ~ 2.7 gal/min. ^{FLUSH} SUPER DOSE OF ALGECIDE RUN THROUGH SYSTEM. FLUSH AGAIN w/ DI. WATER TO ~ 5μS.

1-14-98 OMNIFILTER ELEMENT WAS GREEN. WATER IN NESLAB TANK WAS CLEAR 46μS. INSTALLED RESIN-BONDED CELLULOSE FILTER TEMPORARILY AND ADDED 1L OF HOUSEHOLD BLEACH TO SYSTEM FOR 3 HOUR (C >> 100μS). FLUSH @ ~ 2 g/min FOR 1 HOUR. LUBRICATED BOTH PUMP MOTORS. INSTALLED 20μM PLEATED PAPER FILTER. FLUSHED AGAIN NEXT MORNING TO 30μS CONDUCTIVITY. CHLORINE TREATMENT CAN DISLodge QUITE A BIT OF GREEN JUNK TAKING SEVERAL HOURS TO FILTER OUT.

8-25-98 THE RETURN LINE ANTI-DRAIN VALVE WAS STUCK IN THE OPEN POSITION. REPLACED IT WITH A NEW ONE. SPARES (2) AVAILABLE IN LAB.

11-11-98 THE Neslab Coolflow System # was repaired (see note 3 pages back). After changing the pump some foaming was apparent in the tank. A DI WATER exchange was performed for 1 h with the Return line closed (~2.8 g/min) most of the time (40 min), and with the return line open (~2 g/min) intermittently (20 min). THE CONDUCTIVITY meter needs batteries so did not measure the conductivity.

11-12-98 conductivity ~ 70μS

12-98 FILTER REPLACED IN BLUE CANISTER (By Nick)

liquid or gas by forcing them through a porous medium. The particles are measured or classified in *microns*. The micron equals .000039 of an inch. The microns are some linear equivalents and compare the relative size of particles.

100 microns	1 inch	25.4 millimeters	25,400 microns
50 microns	1 millimeter	0.0394 inches	1,000 microns
10 microns	1/16 of an inch	0.0625 inches	625 microns
5 microns	1 micron	0.000039 inches	1 micron

RELATIVE SIZES

Diameter of a human hair 70 microns
 Lower limit of visibility (naked eye) 40 microns
 White blood cells 25 microns
 Red blood cells 8 microns
 Bacteria (cocci) 2 microns

GENERAL RATING

100 microns very coarse
 50 microns coarse
 20 microns medium
 10 microns fine/medium
 5 microns fine
 1 micron very fine
 .1 micron submicron

FILTER CARTRIDGES

Cartridges offer a much greater area of filtering material and can hold a larger volume of dirt particles. Carbon filters reduce the taste and odor in drinking water. Membrane and submicron filters are used in high efficiency applications. The cartridges listed fit most 4", 10", 20", and 30" filter housings. The ends are Double Open Ended (D.O.E.) unless otherwise indicated.

Multipurpose String Wound Filter Cartridges

- Multi-purpose for organic and petroleum oils
- Non-FDA grade • Polypropylene core
- Maximum temperature is 130° F • 2 1/2" OD
- Full-Body Wound Polypropylene
- Water and general filtering
- Have extra-large filtering capacity
- Fit large diameter housings • Polypropylene core
- Maximum temperature is 130° F • 4 1/2" OD
- Submicron Wound Cotton
- Pre-filter for membranes, high purity solvents, and critical water
- Polypropylene core • Maximum temperature is 120° F • 2 1/2" OD

Wound Acetate	Wound Rayon	Wound Cotton	Wound Polypropylene	Full-Body Wound Polypropylene
Each	Each	Each	Each	Each
4411K13.....\$2.93	4411K14.....\$1.82	4411K31.....\$3.38	4411K71.....\$1.89	4443SK11.....\$4.11
4411K21.....\$3.91	4411K81.....\$2.40	4411K32.....\$3.44	4411K72.....\$1.86	4443SK12.....\$3.89
4411K22.....\$3.96	4411K82.....\$2.47	4411K33.....\$3.49	4411K73.....\$1.83	4443SK13.....\$3.89
4411K23.....\$4.18	4411K83.....\$2.67	4411K34.....\$3.52	4411K74.....\$1.80	4443SK14.....\$3.89
4411K24.....\$4.53	4411K84.....\$2.93	4411K35.....\$3.61	4411K75.....\$1.78	4443SK15.....\$3.89
4411K25.....\$4.80	4411K85.....\$3.11	4411K36.....\$3.69	4411K76.....\$1.76	4443SK16.....\$3.89
4411K26.....\$4.71	4411K86.....\$3.31	4411K37.....\$3.77	4411K77.....\$1.74	4443SK17.....\$3.89
4411K101.....\$7.04	4411K901.....\$4.32	4411K41.....\$5.88	4411K81.....\$3.20	4443SK21.....\$11.70
4411K102.....\$7.12	4411K902.....\$4.44	4411K42.....\$6.00	4411K82.....\$3.22	4443SK22.....\$12.55
4411K103.....\$8.16	4411K903.....\$4.80	4411K43.....\$6.08	4411K83.....\$3.40	4443SK23.....\$13.19
4411K104.....\$8.16	4411K904.....\$5.08	4411K44.....\$6.16	4411K84.....\$3.48	4443SK24.....\$13.19
4411K105.....\$8.28	4411K905.....\$5.28	4411K45.....\$6.16	4411K85.....\$3.48	4443SK25.....\$13.19
4411K106.....\$8.48	4411K906.....\$5.80	4411K46.....\$6.16	4411K86.....\$3.48	4443SK26.....\$13.19
4411K111.....\$9.60	4411K911.....\$5.89	4411K51.....\$8.18	4411K91.....\$4.36	4443SK31.....\$14.89
4411K112.....\$9.71	4411K912.....\$6.05	4411K52.....\$8.18	4411K92.....\$4.33	
4411K113.....\$10.25	4411K913.....\$6.55	4411K53.....\$8.29	4411K93.....\$4.54	
4411K114.....\$11.13	4411K914.....\$6.93	4411K54.....\$8.40	4411K94.....\$4.75	
4411K115.....\$11.29	4411K915.....\$7.20	4411K55.....\$8.40	4411K95.....\$4.75	
4411K116.....\$11.56	4411K916.....\$7.64	4411K56.....\$8.13	4411K96.....\$4.75	

Submicron Wound Cotton—0.5 Micron Rating	20" Cartridge Length	30" Cartridge Length
Each	Each	Each
4411K981.....\$8.58	4411K982.....\$11.80	4411K983.....\$17.70

Resin-Bonded Filter Cartridges

10" Cartridge Length	20" Cartridge Length	30" Cartridge Length
Each	Each	Each
4383SK18.....\$4.05	4383SK28.....\$7.58	4383SK38.....\$11.18
4383SK19.....\$4.33	4383SK27.....\$7.91	4383SK37.....\$11.40
4383SK17.....\$4.35	4383SK26.....\$7.96	4383SK36.....\$11.73
4383SK16.....\$4.35	4383SK25.....\$8.08	4383SK35.....\$12.36
4383SK15.....\$4.15	4383SK24.....\$7.94	4383SK34.....\$10.30
4383SK14.....\$4.24	4383SK23.....\$7.67	4383SK33.....\$11.78
4383SK13.....\$4.58	4383SK22.....\$8.60	4383SK32.....\$12.59
4383SK12.....\$4.97	4383SK21.....\$9.40	4383SK31.....\$14.22

McMASTER-CARR

Carbon Filter Cartridges



Spiral Wound Carbon
 • Remove bad taste, odor, and sediment
 • For point-of-use, single water faucet only
 • Maximum temperature is 125° F • 4 1/8" cartridges have a 2 1/2" OD; 9 1/2" and 9 7/8" units have a 2 1/2" OD
 • Spiral Wound—Choose from a standard cellulose media or a powder activated carbon media with metal adsorption resins for lead removal.

Cartridge Style	Micron Rating	Each
1 1/2" Cellulose	5	4517SK15.....\$3.99
9 1/2" Cellulose	5	4517SK4.....\$4.53
9 7/8" Activated Carbon	0.5	4517SK6.....\$2.38
• Aneke model CNR-10.		

Filled Cartridges—Choose from standard granular carbon media or granular activated carbon media for effectively removing bacteria.

Cartridge Style	Micron Rating	Each
2 1/2" Granular Carbon	20	5165K18.....\$7.94
9 1/2" Granular Activated Carbon	0.4	4517SK17.....\$9.75
• Omni model BC1—maximum temperature is 100° F.		

Pleated Filter Cartridges



Pleated Polyester
 • Clean and reuse in many liquid applications
 • Four square feet of media
 • Maximum temperature is 140° F • 2 1/4" OD

Micron Rating	9 1/2" Cartridge Length	20" Cartridge Length
Each	Each	Each
50	4423SK13.....\$3.97	4423SK23.....\$7.38
20	4423SK15.....3.56	4423SK25.....7.38
5	4423SK17.....3.76	4423SK27.....7.38

High Volume Pleated Polyester
 • Removes more solids than standard pleated units • Six square feet of media • Maximum temperature is 140° F • 2 1/4" OD

Micron Rating	9 1/2" Cartridge Length	19 1/2" Cartridge Length
Each	Each	Each
50	4523SK98.....\$4.86	4523SK27.....\$9.75
20	4523SK99.....4.86	4523SK26.....8.25
5	4523SK95.....4.86	4523SK25.....8.25
1	4523SK43.....5.85	4523SK13.....9.75
0.35	4523SK94.....7.88	

Pleated Polypropylene

• Material meets FDA food contact requirements
 • Ideal for food, beverages, pharmaceuticals, and chemicals
 • Absolute-rated 99.98% efficient for cartridge length
 • 7/2 square feet of media
 • Maximum temperature is 200° F @ 55 psi • 2 1/2" OD

Micron Rating	Each	Micron Rating	Each
4446SK11.....\$40.50	4446SK38.....\$53.17	4446SK22.....\$40.50	4446SK27.....\$53.17
4446SK12.....40.50	4446SK37.....53.17	4446SK23.....40.50	4446SK26.....53.17
4446SK13.....44.32	4446SK36.....56.97	4446SK24.....44.32	4446SK25.....56.97
4446SK14.....44.32	4446SK35.....56.97	4446SK25.....44.32	4446SK26.....56.97
4446SK15.....44.32	4446SK34.....56.97	4446SK26.....44.32	4446SK27.....56.97
4446SK16.....44.32	4446SK33.....56.97	4446SK27.....44.32	4446SK28.....56.97
4446SK17.....44.32	4446SK32.....56.97	4446SK28.....44.32	4446SK29.....56.97
4446SK18.....44.32	4446SK31.....56.97	4446SK29.....44.32	4446SK30.....56.97

Spun and Melt-Blown Polypropylene Filter Cartridges

Spun Polypropylene
 • Removes sediment, sand, silt, scale and rust particles and has excellent chemical resistance
 • Maximum temperature is 145° F • 2 1/2" OD

Cartridge Length	Micron Rating	Each
4 1/2"	5	4517SK19.....\$3.07
9 1/2"	5	4517SK2.....\$4.07
10"	5	4517SK3.....\$4.20
10 1/2"	5	4517SK4.....\$4.33
10 1/2"	5	4517SK5.....\$4.33

Melt-Blown Polypropylene
 • FDA listed materials
 • Use with food and beverages
 • Absolute-rated 99.98% efficiency
 • For consistent, reliable performance
 • Maximum temperature is 200° F @ 15 psi • 2 1/2" OD

Micron Rating	10" Cartridge Lp.	20" Cartridge Lp.
Each	Each	Each
40	4417SK19.....\$9.58	4417SK29.....\$17.57
30	4417SK18.....9.58	4417SK28.....17.57
20	4417SK17.....11.29	4417SK27.....20.70
15	4417SK16.....14.53	4417SK26.....26.83
10	4417SK15.....14.53	4417SK25.....26.83
5	4417SK14.....14.53	4417SK24.....26.83
3	4417SK13.....21.76	4417SK23.....43.57
1	4417SK12.....21.76	4417SK22.....43.57
	4417SK11.....32.58	4417SK21.....59.83

Stainless Steel Filter Cartridges



Cleanable, reusable filters withstand most caustic fluids. These Type 304 stainless steel filters are fashioned by welding and crimping wire cloth; you'll never have to worry about the deterioration of silver brazing or epoxy bonding. Filters are double open-ended with grommet seals that can't be accidentally dislodged. The maximum temperature for cartridges with Buna-N seals is 250° F. Cartridges with Teflon seals have a maximum temperature of 500° F. Maximum differential pressure is 80 psi; outer diameter is 2 1/4". Cartridges are 10" long.

Micron Rating	Filter Style	Buna-N Seals	Teflon Seals
Each	Each	Each	Each
100	Standard	4427SK81.....\$49.11	4427SK81.....\$76.28
100	Pleated	4427SK82.....51.54	4427SK82.....75.38
20	Pleated	4427SK83.....116.15	4427SK83.....140.00
5	Pleated	4427SK84.....187.89	4427SK84.....191.54

Inline Disposable Water Filter Cartridge



Remove unpleasant aftertastes in coffee, tea, citrus, and drinking water. Install on your water line—the activated carbon filter cleans up to 7/2-gallon of water per minute, leaving it practically free of sediment, unpleasant tastes, and odors. When the filter is used up, simply detach, discard, and add a new unit.
 Available with 1/4" brass compression fittings for easy attachment to your 1/2" water supply line, or with a quick-disconnect fitting. Initial installation requires a quick-disconnect adapter sold separately. Color-Maximum pressure is 125 psi; temperature range is 32° to 125° F.
 Measures 2" Dia x 1 1/2" Lp.

Filter with Compression Fitting	Each
4420SK93.....\$10.18	
4420SK94.....9.17	
4420SK95.....8.65	
4420SK96.....8.65	

1581