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.

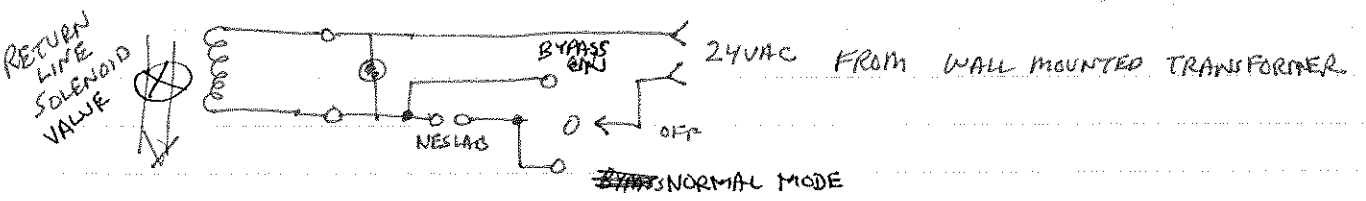
ROOM COOLING LOOP

NESLAB POWER-FAIL SHUTDOWN.

6-95

NESLAB RECIRCULATOR PUTS COLD WATER INTO OVERHEAD PIPES FOR COOLING LAB EQUIPMENT. WHEN THE NESLAB SHUTS DOWN 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

9-96 NESLAB MODIFICATION "POWER OFF LATCH"

AS ORIGINALLY WIRED, THE NESLAB WOULD LATCH 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 ACTIVATION OF THE POWER-ON LATCH. THE TWO LEADS 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

1/95 PUMP SHUTDOWN — CAUSED 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 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 C ~ 77 μS. FLUSHED DI (C = 0.0 μS) THROUGH SYSTEM. AFTER FLUSH C ~ 5–10 μS. 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 μS. FLUSHED SYSTEM WITH DI HOUSE WATER TO C ~ 3 μS. (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)

5-16-96 ADDED BABY BLUE PARTICLE FILTER ("OMNIFILTER!") OVERHEAD AT XPS FEED POINT. 25μ CARTRIDGE INSTALLED. CARTRIDGES ARE STANDARD 9 3/4" ELEMENTS (AVAILABLE FROM McMASTER-CARR). 20μ 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 20uM 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 II was repaired (see note 3 pages back). After changing the pump some foaming was apparent in the tank. A DI WATER change 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 to did not measure the conductivity.

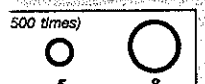
11-12-98 conductivity ~ 70 μS

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

liquid or gas by forcing them through a porous . The particles are measured or classified in *mi-*One micron equals .000039 of an inch. ving are some linear equivalents and compari- explain the relative size of particles.

1 inch	25.4 millimeters	25,400 microns
1 millimeter	0.0394 inches	1,000 microns
1 micron	1/25,400 of an inch	0.001 millimeters
1 micron	3.94×10^{-5}	0.000039 inches

500 times)



5 Microns *8 Microns*

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

idges vary in size, material, and micron size (rating) most any process. ***String wound cartridges*** are the nly used for general liquid filtering applications. They dirt holding capacity. ***Resin-bonded cartridges*** are ked and have approximately 11/2 times more removal olids than string wound units. ***Spun and melt-blown*** ave a higher solids removal rating than resin. ***Pleated cartridges*** offer a much greater area of filtering material and can hold a larger volume of dirt particles. ***Carbon filters*** reduce bad taste and odor in drinking water. ***Membrane and submicronic 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

Acetate
petroleum oil, and vegetable oils in liquids
ess steel core • Maximum temp. is 250° F

Rayon
d alkalies, organic solvents, petroleum
oil • Non-FDA grade • Tinned steel core
erature is 250° F • 2½" OD

rea with good dirt holding capacity for

haped, bleached fiber
ess steel core • Maximum temp is 225° F

Wound Polypropylene
- Multi-purpose for organic and petroleum oils
- Non-FDA grade • Polypropylene core
- Maximum temperature is 130° F • 2½" 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 • 4½" OD

Submicronic Wound Cotton
- Prefilter for membranes, high purity solvents, and critical water
- Polypropylene core • Maximum temperature is 120° F
- 2½" OD

Wound Acetate	Each	Wound Rayon	Each	Wound Cotton	Each	Wound Polypropylene	Each	Full-Body Wound Polypropylene	Each
4411K13	$2.93	4411K14	$1.82						
4411K21	$3.91	4411K81	$2.40	4411K31	$3.38	4411K71	$1.89	44435K11	$8.11
4411K22	3.96	4411K82	2.47	4411K32	3.44	4411K72	1.96	44435K13	6.56
4411K23	4.18	4411K83	2.67	4411K33	3.49	4411K73	1.99	44435K15	6.89
4411K25	4.53	4411K85	2.82	4411K35	3.42	4411K75	1.93	44435K16	2.04
4411K24	4.60	4411K84	2.93	4411K34	3.53	4411K74	2.08	44435K17	2.04
4411K26	4.71	4411K86	3.11	4411K37	3.31	4411K77	2.04	44435K19	7.78
4411K101	$7.04	4411K801	$4.32	4411K41	$5.88	4411K67	$3.20	44435K21	$11.70
4411K102	7.12	4411K802	4.44	4411K42	6.00	4411K68	3.32	44435K23	12.55
4411K103	7.52	4411K803	4.80	4411K43	6.08	4411K69	3.40	44435K25	13.19
4411K104	8.16	4411K804	5.08	4411K44	6.16	4411K78	3.48	44435K26	4.09
4411K105	8.28	4411K805	5.28	4411K45	6.16	4411K65	3.48	44435K27	4.09
4411K106	8.48	4411K806	5.60	4411K46	5.96	4411K66	3.68	44435K29	14.89
4411K111	$9.60	4411K811	$5.89	4411K51	$8.02	4411K92	$4.36		
4411K112	9.71	4411K812	6.05	4411K52	8.18	4411K93	4.53		
4411K113	10.25	4411K813	6.55	4411K53	8.29	4411K94	4.64		
4411K114	11.13	4411K814	6.93	4411K54	8.40	4411K95	4.75		
4411K115	11.29	4411K815	7.20	4411K55	8.40	4411K96	4.75		
4411K116	11.56	4411K816	7.64	4411K56	8.13	4411K97	5.02		

SUBMICRONIC WOUND COTTON—0.5 MICRON RATING

Each	Cartridge Length	Each	Cartridge Length	Each
4411K981 $6.56	20"	4411K982 $11.80	30"	4411K983 $17.70

Resin-Bonded Filter Cartridges

city
compatibility
fluid absorption
rature is 275° F

Micron Rating	10" Cartridge Length	Each	20" Cartridge Length	Each	30" Cartridge Length	Each
150	43835K18	$4.05	43835K28	$7.58	43835K38	$11.16
100	43835K17	4.33	43835K27	7.91	43835K37	11.40
75	43835K16	4.35	43835K26	7.96	43835K36	11.73
50	43835K15	3.73	43835K25	6.98	43835K35	10.36
25	43835K14	4.15	43835K24	7.04	43835K34	10.59
10	43835K13	4.24	43835K23	7.67	43835K33	11.78
5	43835K12	4.58	43835K22	8.60	43835K32	12.58
2	43835K11	4.87	43835K21	9.40	43835K31	14.22

Micron Rating	9¾" Cartridge Length	Each	20" Cartridge Length	Each	30" Cartridge Length	Each
25	43975K53	$3.74	43975K63	7.47	43975K73	11.20
10	43975K54	3.88	43975K64	7.75	43975K74	11.62
5	43975K55	4.03	43975K65	8.06	43975K75	12.08
1			43975K61	$7.21	43975K71	$10.81

Carbon Filter Cartridges

Spiral Wound Carbon

Filled Carbon

- Remove bad taste, odor, and sediment
- For point-of-use, single water faucet only
- Maximum temperature is 125° F • 4⅞" cartridges have a 2½"OD; 9¾" and 9⅞" units have a 2¾" OD

Spiral Wound—Choose from a standard cellulose media or a powder activated carbon media with metal absorption resins for lead removal.

Cartridge Style	Micron Rating		Each
4⅞" Cellulose	5	45175K15	$3.99
9¾" Cellulose	5	45175K4	4.63
9⅞" Activated Carbon	0.5	45175K66♦	32.38

♦Ametek model CMR-10.

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

Cartridge Style	Micron Rating		Each
4⅞" Granular Carbon	20	5165K18	$7.94
9¾" Granular Carbon	20	5165K17	9.75
10" Granular Activated Carbon	0.4	45175K76♦	26.85

♦Omni model BC1—maximum temperature is 100° F.

Pleated Filter Cartridges

Pleated

High Volume

Pleated Polyester
- Clean and reuse in many liquid applications
- Four square feet of media
- Maximum temperature is 140° F • 2¾" OD

Micron Rating	9¾" Cartridge Length	Each	20" Cartridge Length	Each
50	44295K13	$3.97	44295K23	$7.36
20	44295K15	3.56	44295K25	7.36
5	44295K17	3.76	44295K27	7.36

High Volume Pleated Polyester
- Removes more solids than standard pleated units • Six square feet of media • Maximum temperature is 140° F • 2¾" OD

Micron Rating	9¾" Cartridge Length	Each	19⅛" Cartridge Length	Each
100	45235K98	$4.86		
50	45235K97	4.86	45235K27	$9.75
20	45235K96	4.86	45235K26	8.25
5	45235K95	4.86	45235K25	8.25
1	45235K43	5.85	45235K13	9.75
0.35	45235K94	7.88		

Pleated Polypropylene
- Material meets FDA food contact requirements
- Ideal for food, beverages, pharmaceuticals, and chemicals
- Absolute-rated 99.98% efficient for consistency and reliability
- 7.2 square feet of media • 10" cartridge length
- Maximum temperature is 200° F @ 35 psi • 2½" OD

Micron Rating		Each	Micron Rating		Each
70	44465K21	$40.50	2	44465K26	$53.17
40	44465K22	40.50	1	44465K27	56.97
20	44465K23	40.50	0.45	44465K28	63.30
10	44465K24	44.32	0.2	44465K29	82.28
5	44465K25	44.32			

Spun and Melt-Blown Polypropylene Filter Cartridges

Spun Polypropylene
- Removes sediment (sand, salt, scale and rust particles) and has excellent chemical resistance
- Maximum temperature is 145° F • 2⅜" OD

Cartridge Length	Micron Rating		Each
4⅞"	5	45175K19	$3.01
9⅞"	5	5165K42	4.07
20	5	5165K43	8.30
30	5	5165K44	10.11

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
- 2⁹⁄₁₆" OD

Micron Rating	10" Cartridge Lg.	Each	20" Cartridge Lg.	Each
70	44175K19	$9.58	44175K29	$17.57
40	44175K18	9.58	44175K28	17.57
30	44175K17	11.29	44175K27	20.70
20	44175K16	14.53	44175K26	26.63
15	44175K15	14.53	44175K25	26.63
10	44175K14	14.53	44175K24	26.63
5	44175K13	23.78	44175K23	43.57
3	44175K12	27.75	44175K22	50.87
1	44175K11	32.58	44175K21	59.83

Stainless Steel Filter Cartridges

Standard

Pleated

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 disintegration 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 60 psi; outer diameter is 2¾". Cartridges are 10" long.

Micron Rating	Filter Style	Buna-N Seals	Each	Teflon Seals	Each
100	Standard	44275K81	$49.11	44275K61	$76.29
100	Pleated	44275K82	51.54	44275K62	75.38
20	Pleated	44275K83	116.15	44275K63	140.00
5	Pleated	44275K84	167.69	44275K64	191.54

Inline Disposable Water Filter Cartridge

Remove unpleasant aftertastes in coffee, ice cubes, and drinking water. Install on your water line—the activated carbon filter cleans up to ½-gallon of water per minute, leaving it virtually free of sediment, unpleasant tastes, and odors. When the filter is used up, simply detach, discard, and add a new unit.

Available with ¼" brass compression fittings for easy attachment to your ¼" water supply line, or with a quick-disconnect fitting. Initial installation requires a quick-disconnect adapter sold separately below. Maximum pressure is 125 psi; temperature range is 32° to 125° F. Measures 2" Dia. × 12" Lg.

	Each
Filter With Compression Fitting	44205K93 $10.18
Filter With Quick Disconnect Fitting	44205K94 9.17
Installation Adapter For 44205K94	44205K96 6.65