NCR 101 Controlled Environment Working Group 2000
McGill University Phytotron
Montreal, Canada
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Phytotron Equipment Upgrades

Growth Chamber Cooling System:

After 12 years of service, the Phytotron growth chamber cooling system is to be overhauled and possibly modified in the coming year. The cooling tower has become prematurely corroded and will be replaced. An engineering study has been initiated to determine the feasibility of increasing the capacity of the tower and installing a plate heat exchanger which would isolate the chamber cooling loop from the cooling tower loop. This design has been proven to reduce condenser fouling and treatment chemical requirements.

The condition of the water-cooled, growth chamber condensers was evaluated to determine if any cleaning or flushing was warranted. A series of stress-tests were carried out on a 10 year old Conviron PGW36-M10 chamber situated near the end of the cooling loop (lowest flow rate, highest potential fouling). The chamber was run at two extremes of programmed temperature and at 2 cooling water temperatures (typical winter & summer levels). The resulting operating pressures and temperatures are presented in the Table 1 below.

Table 1 : Growth Chamber Stress Test – Conviron PGW36 – M10Canopy – Jan 2000

Growth Chamber Program	4°C & full lighting (8,8)*		45°C & full lighting (8,8)	
Cooling Tower Setting	15.4	26.4	15.4	26.4
Actual Chamber Temperature	4.1	4.3	44.9	44.9
_ **Operating Pressure**				
Head (***psig***)	195	215	185	203
Suction (***psig***)	47	50	67	68
Cooling Water Temperature				
(at Condenser) Inlet	15.1	26.4	15.4	26.8
Outlet	30.8	33	33.8	33.6
Refrigerant (F22) Temperature				
(at Condenser) Inlet	94	102	102	104
Outlet	39	42	37.7	41
Compressor Temperature				
Crankcase	50	54	65.7	65
Discharge	97	104	107	107.5

* Factory Program specification was 4°C No lights (00)

_ Factory Refrigeration Specifications:
Maximum Head Pressure = 210 psig @ 4°C & 45°C
Minimum Suction Pressure = 38 psig @ 4°C & 64 psig @ 45°C

All temperatures in degrees Celsius (°C)

The chamber performed remarkably well, holding programmed setpoints (despite having additional cooling load imposed *factory specification was 4°C & No lights!) and maintaining acceptable refrigeration pressures. Based on the test results, the engineers have decided to delay cleaning or flushing the chamber condensers at this point in time.

Query to Members: Anyone willing to share their experiences in cleaning water-cooled condensers with acidic or other solutions is encouraged to contact Mark at *mark@bio*1.*lan.mcgill.ca*

Humidity Control System:

Many facilities will experience difficulties with humidification components resulting from varying qualities of water resources and efficiencies of filtration and Reverse-Osmosis systems. In our facility, the R/O water was particularly reactive with all brass components of our RH% system. We have begun replacing the existing additive RH% components (SNH), which include brass elements (valves, barrels & nozzles) with PVC & Stainless Steel components. Testing of new components has demonstrated a marked reduction of spray nozzle failure due to plugging and corresponding maintenance required. The factory-supplied Sporlan brass valve was replaced with an ASCO PVC valve (Model SC8260G71), brass barrels with a PVC adapter (Conviron #70138) and Steinen spray nozzles with a 100% stainless steel nozzle (Model 303SS, # _ MS1, John Brooks Company, Pointe Claire, Qc.)

Conferences / Workshops

Greenhouse Designs and Greenhouse Systems
AERGC Annual Meeting, July 19-22, 2000

The annual meeting of the Association of Education and Research Greenhouse Curators will be held at the University of Guelph in Guelph, Ontario. The meeting will include talks and discussion sessions on greenhouse design problems and solutions and will include tours of the greenhouse facilities at the University of Guelph as well as an all day tour of the Niagara area including the Butterfly Conservatory. Meeting details may be found on the AERGC web site or by contacting the meeting coordinator, Ron Dutton < rdutton@uoguelph.ca >.

< http://www.life.uiuc.edu/aergc/AnnMtg2000/AnnMtg2000.html >

Publications

Wang, Z.M., K.H. Johnson & M.J. Lechowicz. 1999.
Is climate simulation in growth chambers necessary?.
Biotronics v.28 p 13-21.