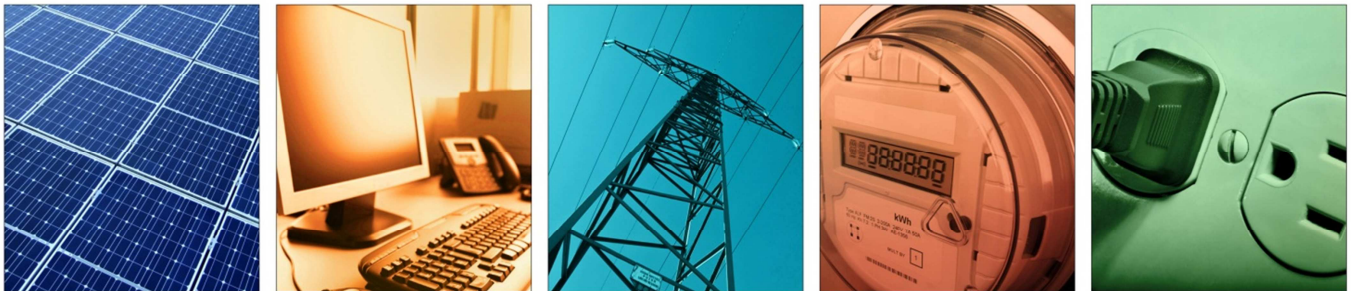


# Reverse Cycle Chiller for Multifamily Pilot – Project Update

## Pilot Study #1 Commissioning Report

22 April 2013



**A Report of BPA's Energy Efficiency's Emerging Technologies Initiative**

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**Contract Number 35753**

# **Stream Uptown, LLC Reverse Cycle Chiller Commissioning Report**



## **Prepared for:**

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**April 22, 2013**

## Introduction

This report documents commissioning activities for the Reverse Cycle Chiller system installed at the Stream Uptown multifamily project located at 708 6<sup>th</sup> Ave. N, Seattle, WA 98109. The Reverse Cycle Chiller (RCC) is setup to provide heat pump water heating for a central domestic hot water system for the 118 unit apartment project. The RCC functions as the primary garage exhaust system and domestic hot water (DHW) heat plant. The heat pump recovers heat from the below grade parking garage air prior to it being exhausted out of the garage. This report covers the details of the Commissioning (Cx) activities for the project.

Figure 1: RCC Garage Layout and Airflow Schematic

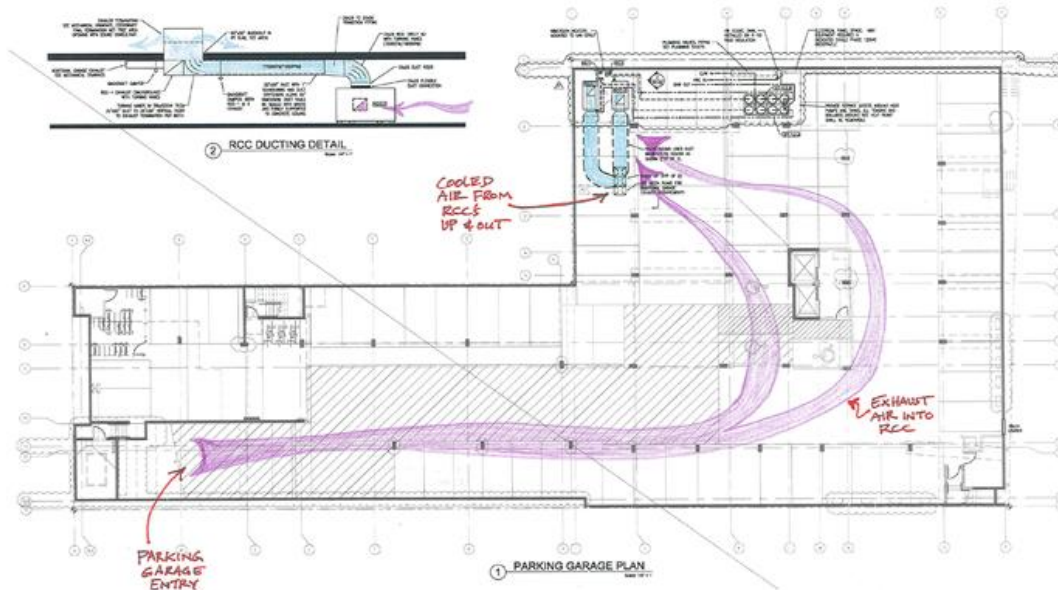
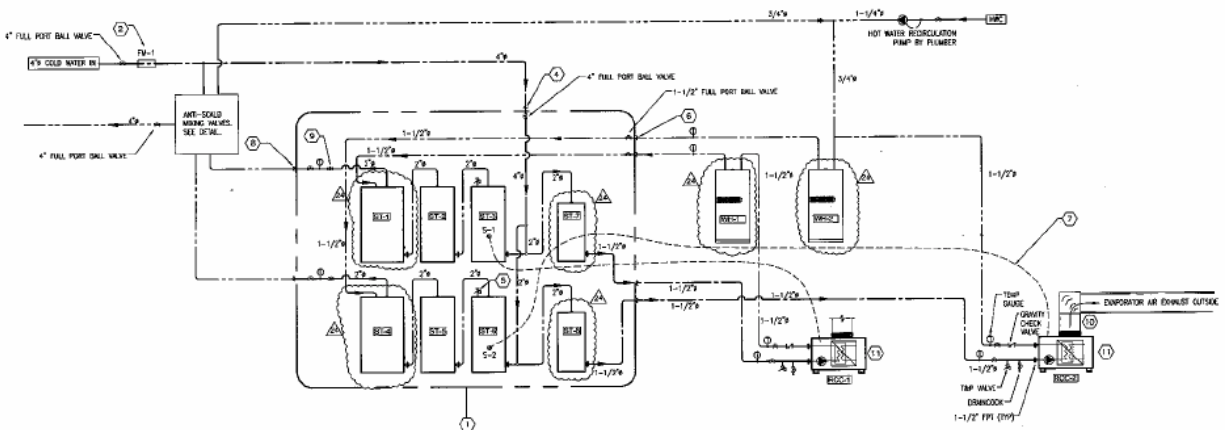


Figure 2 RCC Heat Plant Schematic



## Equipment

The RCC heat plant consists of 2 reverse cycle chillers, 2 backup electric tanks and 8 hot water storage tanks and associated piping, valves, insulation, etc.

### RCC #1: Reverse Cycle Chiller 1

Model: Colmac HPA 15-PBGC

Serial Number: 082012HPA15-118

### RCC #2: Reverse Cycle Chiller 2

Model: Colmac HPA 15-PBGC

Serial Number: 082012HPA15-117

### WH #1: Backup Electric Water Heater 1

Model: Lochinvar HSP45080

Serial Number: 1225M002558

### WH #2: Backup Electric Water Heater 2

Model: Lochinvar HSP45080

Serial Number: 1225M002556

### HWS #1-8: Hot Water Storage Tanks (2@80 gal, 4@120 gal, 2@200 gal)

Model: J28-80A, J-28-120A, J-32-200A

## Commissioning of Systems

### RCC-1&2

Item	Setpoint	Comments
Installation per contract documents (Y/N)	Yes	RCC's have been installed per contract documents and are performing in accordance with the final owner's project requirements (OPR) document. RCC's are installed in the designated locations, bolted down for seismic bracing, include flexible connections for exhaust ducting, ductwork securely fastened to building structure, exhaust air terminates outside per local codes.

RCC Output Temperatures	132-135 F	RCC's are setup to deliver fixed hot water temperature of approximately 133 deg F in a single pass arrangement. Each RCC has a 3-way modulating control valve that modulates water flow to maintain a single output temperature in one pass. We observed output temperatures between 132-135F with normal fluctuations associated with PID valve control.
Aquastat setpoints	On-117F Off-120F	RCC's include remote sensor and internal PLC board setup to fire RCC's when first tank drops below 117F and powers off when first tank reaches 120F.
Exhaust Ducting	Yes (R-4)	Exhaust Ducting is internally insulated with 1" sound lining to reduce noise and prevent condensation on external ductwork.

**WH-1&2**

Item	Setpoint	Comments
Installation per contract documents (Y/N)	Yes	Water Heaters have been installed per contract documents, heaters have been piped per contract documents, piping is adequately supported, seismic strapping is present, piping insulation, T&P's relief installed.
Water Heater Aquastat Setpoints	125F	WH-1&2 are setup to fire at 125F. Since the RCC is set to output 130 deg F water which routes through the electric tanks, these are only needed if the RCC fails to produce 130 deg F water.

**ST-1 to 8**

Item	Setpoint	Comments
Installation per contract documents (Y/N)	Yes	Storage tanks have been installed per contract documents, heaters have been piped per contract documents, piping is adequately supported, seismic strapping is present, piping insulation is present, T&P's reliefs installed.
Setpoints	On-117F Off-120F	Storage tank setpoints are set by RCC-1 and 2 aquastat sensors controlled from PLC.

**Misc:**

Detail	Setpoint	Comments
Piping Insulation	Yes	Piping is insulated per WSEC, 1-1/2" fiberglass insulation. Cold water is heat traced for freeze protection
Recirculation Pumps	On	2 Hot water recirculation legs are installed in this project, both of the recirculation pumps (B&G Series 100) are installed and operating per specs
Thermostatic Mixing Valves	123 F	Two 2" thermostatic mixing valves are installed and set to deliver 123 F water to distribution loop. Water at the top floor was measured at 119F supply with adequate pressure.

## Commissioning Log

Acronyms: NKA - NK Architects, PC - Plumbing Contractor (JJ's Plumbing), MC - Mechanical Contractor (GB Systems), B1 - Owner (Brook 1), GC - General Contractor (Compass)

Note that Issues Log excerpted below includes only the items related to the RCC system.

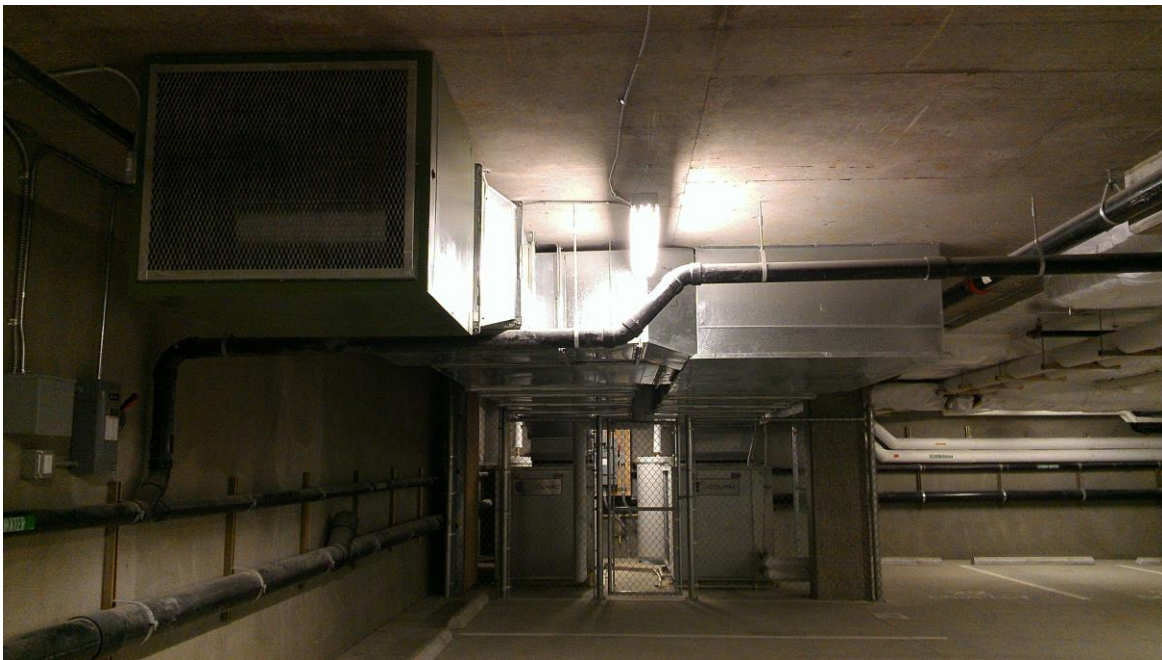
Issue #	Date Noted	System	Issues	Assigned to	Corrective Action	Response / Completed / Verified Date	Notes	Status
36	12/4/12	RCC Garage Exhaust	Backdraft dampers are missing on all 3 garage exhaust ducts to outdoors. Noticed some exhaust air short cycling back into garage. Install backdraft dampers on all exhaust air streams.	MC/GC	Install backdraft dampers	MC-2/20/2013	Backdraft dampers installed	Closed
37	12/4/12	RCC Garage Exhaust	Seal all garage exhaust ducts, noticed some air leakage back into garage.	MC/GC	Ducting should be sealed airtight.	MC-2/20/2013	Ducting has been sealed	Closed
38	12/4/12	Piping Insulation	Hot water piping in garage still has pieces that are exposed, insulate all hot water piping.	PC/GC	Insulate all exposed piping around unions and elbows and tank connections	GC-3/5/2013	Piping is insulated	Closed
39	12/17/12	RCC Filters	There is considerable construction debris in the RCC intake air filters. These filters are washable and should be cleaned or replaced prior to close-out.	GC	Clean or replace RCC intake air filter.	MC-3/5/2013	Filters have been cleaned	Closed
40	12/17/12	Thermostatic Mixing Valves	Hot water delivered to apartments should be set to 123 deg F. Current settings are 118F for the West and 125F for the East mixing station.	GC	Plumber to set mixing valves to 123F.	PC-1/17/2013	Setpoints adjusted and confirmed	Closed
41	12/18/12	Signage	Specifications called for alarm signage stating that tenants should call building owner or leasing manager if RCC is in an alarm state.	GC	Signage has been posted on surrounding fence.	GC-3/4/2012	Signage has been installed	Closed

## Photos

Photo 1: RCC's Looking West



Photo 2: RCC's Installation Looking North



**Photo 3 & 4: RCC Discharge Location and RCC Piping Connection**



**Photo 5: Hot Water Storage Tank Skid**





Photo 6: RCC Controls/Pumping Internals



Photo 7: RCC Intake Air Filter



Photo 8: RCC Evaporator Fan and Coil



Photo 9: Hot Water Storage Tanks Serial Tanks

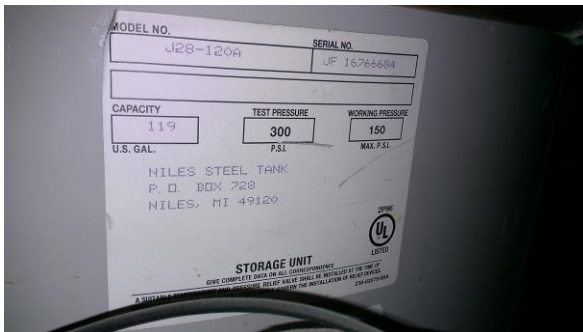


Photo 10: RCC Serial Numbers

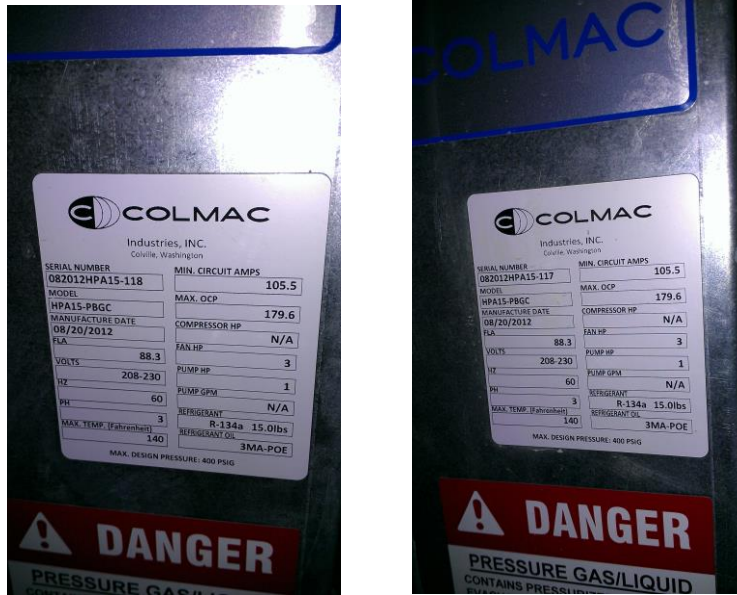


Photo 11: Electric Water Heater Serial Numbers

