

Edl, Michele

From: Erica Stephenson [estephenson@tranter.com]
Sent: Thursday, April 12, 2012 10:35 AM
To: Edl, Michele
Subject: RE: specs needed for Tranter HE
Attachments: SKMBT_C35312041115120.pdf

Michele,

That serial number is exactly what I needed. Each Tranter heat exchanger has a specific and individual serial number (like a VIN on a car) which identifies that particular unit. I've attached the original drawing which details original operating conditions for the unit; please let me know if you need any additional details.

Erica Stephenson
Inside Sales and Service
Tranter Inc, West Coast Svc Center
Phone: 559-686-1840
Fax: 559-686-3964
www.tranter.com

From: Edl, Michele [<mailto:Michele.Edl@idwr.idaho.gov>]
Sent: Wednesday, April 11, 2012 11:46 AM
To: Erica Stephenson
Subject: RE: specs needed for Tranter HE

I don't have drawing numbers. The only number I have listed as a serial is **SH748** which seems too short to provide identification.

I believe that of the 3 Tranter HEs in the building, only one of them serves the 24/7 cooling loop. It is model GCD -016-J-5-HP-60. (I wasn't sure of this number earlier.)

The other two are GXD..... and so far I don't think I need to know what they can do. I am only trying to license the cool water uses.

From: Erica Stephenson [<mailto:estephenson@tranter.com>]
Sent: Wednesday, April 11, 2012 12:13 PM
To: Edl, Michele
Subject: RE: specs needed for Tranter HE

Michele,

I apologize for the delayed response; I hope you received my Out of Office reply.

Can you confirm the drawing or serial numbers from the units? The model number is not specific enough for us to determine the heat exchange capabilities of those particular units.

Erica Stephenson
Inside Sales and Service
Tranter Inc, West Coast Svc Center

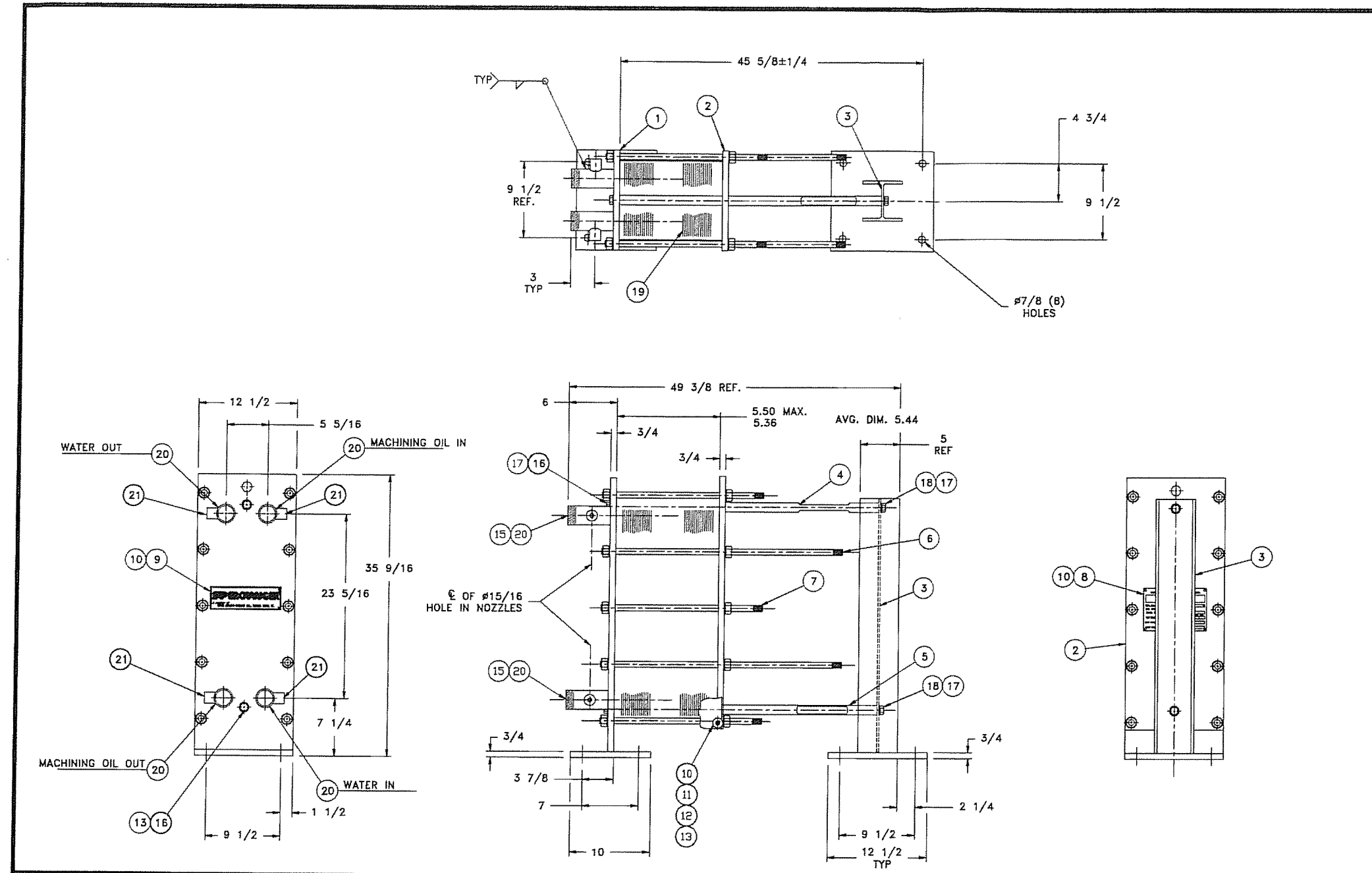


PLATE SPECIFICATIONS			
"A" PLATES		"B" PLATES	
HOLE PUNCH NO.	NO. REQ'D	HOLE PUNCH NO.	NO. REQ'D
1234	29	1234	29
0234		0234	
1200		1200	
0034		0034	
0204		0204	
1004		1004	
E0000	1	D1234	1
TOTAL	30	TOTAL	30

PLATE ASSEMBLY									
PLATE NO.	TYPE	ARROW	GASKET						
1	H	DOWN	FULL GASKET FRONT, UPPER RH & LOWER LH PORT						
EVEN 2-58	H	UP	FULL GASKET FRONT, UPPER LH & LOWER RH PORT						
ODD 3-59	H	DOWN	FULL GASKET FRONT, UPPER RH & LOWER LH PORT						
60	H	UP	FULL GASKET FRONT, UPPER LH & LOWER RH PORT						
SECTION	FLUID NAME	FLOW RATE (GPM)	INLET TEMP. °F	OUTLET TEMP. °F	PRESSURE DROP (PSI)	PLATE ARRANGEMENT	PLATE	GASKET MATERIAL	NOZZLE
1	WATER	69	87	67	6.01	29H X 1	316	NBR	C.S.
	COLD WATER	69	62	81.98	5.76	30H X 1	316	NBR	C.S.

NOZZLE LOCATION	"F" DIA. HOLE
S1	2 7/16
S2	2 7/16
S3	2 7/16
S4	2 7/16
M1	
M2	
M3	
M4	

PARTS LIST			
ITEM NO.	DESCRIPTION	DRAWING NO.	NO. REQ'D.
1	STATIONARY FRAME ASS'Y. SA-516-70	D-6-22525-2	1
2	MOVEABLE FRAME SA-516-70	D-204711	1
3	GUIDE BAR SUPPORT	D-6-22525-3	1
4	UPPER GUIDE BAR (WORKING LGTH. 40 3/4)	B-204530-2	1
5	LOWER GUIDE BAR (WORKING LGTH. 40 3/4)	B-203647-2	1
6	BOLT ASS'Y. (WORKING LGTH. 18)		
7	3/4 DIA. CARBON STEEL SA-193-B7	D-204679-4	4
8	BOLT ASS'Y. (WORKING LGTH. 14)		
9	3/4 DIA. CARBON STEEL SA-193-B7	D-202679-1	6
10	DATA NAMEPLATE	B-202112	1
11	NAMEPLATE	B-201954	1
12	METAL TACK FASTENER	A-203187	8
13	SHROUD SET ("L" DIM: 9 5/16)	D-204260	1
14	SHROUD, STUD	A-200830	12
15	SHROUD, NUT	A-200831	12
16	SHROUD, WASHER	A-200832	12
17	THREAD PROTECTOR (NOT SHOWN)	A-38876	4
18	GUIDE BAR BOLT	B-203480-5	2
19	GUIDE BAR WASHER	B-203482	4
20	GUIDE BAR BOLT	B-203480-11	2
21	PLATE	---	60
22	NOZZLE 2" STR ("S" FRAME)	D-203626-4	4
23	2 1/2-2 X 1/2" 3000 LB THREDOLET C.S.		4

NOZZLE DIMENSIONS	
THREADED PIPE	
SIZE	2"
DIM	
A	2 3/8
B	N.P.S. SCH 40 WALL
C	N.P.T.

SPECIFICATIONS	
DESIGN PRESSURE:	75 PSI
TEST PRESSURE:	98 PSI
DESIGN TEMP.:	150 °F
NO. OF PLATES:	60
SURFACE AREA:	84.28 SQ.FT.
WEIGHT:	453 LBS
PAIN:	SEE NOTE #4

- NOTES
1. FLEXIBILITY IN PIPING SYSTEM IS RECOMMENDED TO PROVIDE FOR THERMAL EXPANSION AND VIBRATION.
 2. SUPPORT MOVEABLE FRAME @ BOTTOM DURING SHIPPING.
 3. TAG: 55094-03-60-532
 4. BLAST ALL CARBON STEEL SURFACES PER SSPC-SP-6 (COMMERCIAL BLAST) APPLY (1) COAT AMERON AMERLOCK 2 4-8 MILS DFT. (COLOR: ROYAL BLUE).
 5. UNIT DESIGNED FOR SEISMIC ZONE #3 PER UBC 1997.

TRANTER
A DOVER COMPANY

TRANTER PHE, Inc., Wichita Falls, Texas

PROPERTY OF TRANTER PHE, Inc. AND NOT TO BE REPRODUCED WITHOUT THEIR CONSENT NOR USED IN ANY MANNER DETRIMENTAL TO THE INTEREST OF TRANTER PHE, Inc.

CUSTOMER: R.M. MECHANICAL INC

SERIAL NO.: SH748

TITLE: SUPERCHANGER

MODEL: GCD-016-H-5-HP-60

DRAWN BY: EP

CHECKED AND APPROVED BY: CB

DATE: 12-16-03

DATE: 12-17-03

SCALE: S/0 22525

DWG. NO.: D-6-22525

THIRD ANGLE PROJECTION

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

FRAC TIONAL: 1/8 DECIMAL: .01 ANGULAR: 1/2

REMOVE BURRS AND SHARP EDGES. COMMERCIAL TOLERANCES APPLY FOR GASKETS, TUBING AND BAR STOCK

FINAL COMMISSIONING MANUAL



Turner / McAlvain Construction

**Idaho Water Center
Boise, Idaho**

June 2005

Idaho Water Center

Boise Idaho

Final Commissioning Report Executive Summary

The commissioning process for the Idaho Water Center was carried out between March 2004 and September 2004. A post occupation follow up was carried out in November 2004 to assess the operation of the heating systems.

The initial portions of the site work was restricted to inspection of the work for compliance with contract documents, recommendations relating to the physical installation and comments made during these visits were, over time, corrected or approved by the engineering authority.

Preliminary data from the T.A.B. agency (testing and balancing agency) was reviewed on several occasions with comments being issued at each review. These comments and / or requests for data were in general completed, however several minor items still remain unresolved or incomplete in the issued and enclosed final balancing report.

Commissioning check sheets, for mechanical and electrical services, were issued to the contractor for use on the shell and core and tenant improvement portions of the project. Only one copy of each was issued to site so that collected and checked information would be fully coordinated between the various disciplines. The enclosed are the results of the mechanical contractor's use of the issued sheets. The electrical check sheets were issued to the contractor for use during the contract however it was agreed that for cost savings that the completion of the electrical sheets be removed from the scope of work.

The functional operational tests were conducted in conjunction with Allen Arington of Turner Mc Alvain.

During these tests several non conforming systems were adjusted or revised to provide the operational performance required by the engineering authority. Some system problems remain unresolved such as the testing and tracking of the main return fans.

The initial AHU-1 cooling coil performance indicated that one group of coil sections discharge temperature was higher than specified but overall air system performance was within specified limits. The manufacturer was reviewing the final data but their comments were not received prior to the shut down of the cooling system. The final submitted Test and Balance report indicates that the coil is working within specified parameters, however it is unclear the operational differences when compared to the initial test.

We understand that some system instability has been caused by the tenant improvement work now progressing on the south end of the building and that re balancing will be carried out. Special attention should be paid to the fan tracking system to ensure that the building pressurization is properly maintained over the operating range of the fan systems.

Control functions were checked in conjunction with the Control sub trade and trend logs reviewed. Some set point revisions and sequence of operation changes were made to provide the operational performance required by the engineering authority. Small changes will still be

necessary during the first few months of each season as well as time schedule changes as operating times of the building become standardized.

A seasonal site visit was made to review the operation of the heating system. Revisions were made to the valve operation that allowed better control of the secondary water temperature. The primary heating source for the domestic water was revised to geothermal water from the secondary heating system. This revision allowed the secondary heating water reset to be reduced below 160F and the heating water system to be shut down during the cooling season. These changes were reviewed and accepted by the engineering authority.

Problems were noted with stratification of heat in the entrances and the control of the entrance heaters. This was reviewed and we understand that revisions to the systems have been made. Airflow and water flow balancing data was reported, however heat output has not been verified.

Observations made of the power use and power factor were made at the main metering panels. It was noted that the power factor in the building varied between 73% and 83% these readings are extremely low considering that the building power invoices are based on demand. The addition of some form of power factor correction would increase the readings to the 98-99% range and have a considerable effect on reducing the cost of power for the facility. Power bills were requested to enable a study to be carried out and recommendations made.

**IDAHO WATER
CENTER
BOISE, IDAHO**

TEST AND BALANCE REPORT

REVISED 11/19/2004

REVISED 12/04/2004



Test and Balance Company

13925 Dekay - Pocatello, Idaho - 208.238.5817

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GENERAL SYSTEM DESCRIPTION

The Idaho Water Center HVAC system incorporates many different systems. Among these, are systems that are very energy efficient, and "cutting edge" in the industry. Among these, are the design and implementation of an underfloor plenum system. In addition, the availability of geothermal heating capabilities the area provides has also been included in this system. Integrating these systems with the latest technology in building management and control, this building is designed to provide optimal energy conservation without sacrificing quality of environment.

There are also specialty systems throughout the building including server rooms on various floors as well as laboratory exhaust systems. The majority of the south end of the building is reserved for future build-out. As such, minimal systems are operating in these areas.

Underfloor Plenum System:

The underfloor plenum system is comprised of three main components:

- Penthouse Air Handling Units
- Underfloor Fan Coil Units
- Plenum Distribution

Penthouse Air Handling Units:

The North Penthouse houses AH-1, while the South penthouse contains AH-2 and AH-3. The supply fans in these units operate on duct static pressure. When the duct static pressure reaches setpoint, the variable frequency drive (VFD) decreases fan speed. When duct static pressure is below setpoint, the VFD increases speed until setpoint is achieved.

Each air handler is equipped with 6 primary cooling coils and 6 primary heating coils. Each coil has an adjustable flow control valve which has been set to maintain designed flows. The pumps serving these coils also have VFD's on them. Chilled water pumps are controlled on differential pressure, and heating water pumps are controlled on differential temperature. It should be noted, that these pumps are not exclusive to the air handlers. They also provide heating and cooling water for other systems in the building.

Underfloor Fan Coil Units:

Levels 2 thorough 6 have underfloor fan coil units with fans. There are two brands/types

-Titus VAV intake: These units are equipped with a variable air volume intake which pulls cold air from the supply plenum. If room temperature is above

setpoint, the amount of cold air taken in is increased. As setpoint is satisfied, this damper closes to a minimum. Intake air mixes with return air for each zone.

-Envirotec CV: These units are not equipped with a VAV intake. They are constant volume units. They pull 100% air from the underfloor plenum. These units are installed in the laboratory areas, so exhaust systems relieve positive pressure these zones.

All underfloor fan coil units (both types) are equipped with heat/reheat coils. If room temperature falls below setpoint, control valves open and allow flow to the coils. These coils are also equipped with flow control valves that have been set to design flows.

Plenum Distribution:

Each air handler distributes air to the lower floors through a chase that runs from the penthouse to the second floor. At each floor, there is a damper that opens to supply air. This damper is controlled on underfloor static pressure. Each damper has two sensors located throughout the floor. The dampers maintain a setpoint of 0.10 in. w.c. When the dampers are at minimum, pressure increases in the chase, which contains the sensors for the air handlers. The VFDs on the air handlers respond accordingly.

Air is ducted from the branch take-offs at each level and distributed throughout the levels underneath the floor. These ducted plenums have either a round or square damper that is at a set, locked position.

Level 1 Air Handlers:

The air handlers on this level (AH-4 through AH-7) are separate from the upper levels with respect to air distribution. They do, however, share the hydronic system. These air handlers are specific to zone and do not integrate with one another.

AH-4 and 5 are constant volume systems, whereas AH-6 and 7 are VAV systems.

A/C Units:

There are two A/C units on the 4th and 5th Floor which provide cooling for the server rooms. These systems use ground water for cooling, which is exclusive to AC-3 and AC-4 only.

ACU 1 and 2 serve the first floor main electrical room and MDF room, respectively. Cooling for these units is provided via DX condensing units located in the parking garage.

ACU-3 is located and serves the Elevator machine room in the penthouse directly above the elevator shafts. This unit is self-contained.

Exhaust Systems:

Exhaust systems can be broken down into 3 distinctive areas:

- Penthouse Exhaust: These fans can best be characterized as ones that account for building conditions. Specifically, they affect pressurization of the building. These include the laboratory exhaust and general building exhaust. These fans are integrated into the building control system, but run constantly.
- Electrical/Telecom Exhaust: These systems circulate air from the corridor, through the electrical and telecommunications rooms, and discharge into the ceiling return plenum. They operate on a thermostat in each location to prevent rooms from overheating.
- Parking Garage Exhaust: These fans are exclusive of the rest of the building. They operate on CO² sensors. When levels are above setpoint, sensors initiate the fan sequence, thereby evacuating particulates to acceptable levels.

Hydronic Systems:

Chilled Water – Air Handlers:

Cooling water for coils is provided by a chiller system located in the basement. This chiller is adjacent to the main mechanical room. Two pumps distribute the chilled water throughout the building. Pumps are controlled by VFDs which monitor differential pressures at locations in the penthouses.

Cooling Water – A/C Units:

Cooling water for the A/C units is provided using ground water. Source ground water is run through the primary side of a heat exchanger. Cooling water for the A/C units is provided through the secondary side of the heat exchanger.

Heating Water:

Heating water for the entire HVAC system is provided by using geothermal water. This water is run through the primary side of two heat exchangers. The secondary side of the heat exchangers provides heating water for all heating coils in the building. Pumps draw the water through the secondary side based on differential temperature of the heating water supply and return.

Secondary Heating Systems:

Secondary heating is provided by three different types of equipment.

-Unit heaters: Fan-powered unit heaters are installed in the penthouses, receiving area, and future build-out space. Flow control is provided via an aquastat to actuate the flow control valve, and a thermostat to control the fan. Each unit is

equipped with an adjustable balance valve which has been set to maintain design flows when the control valve is opened.

-Radiant panel heaters: These heaters serve the North and East perimeters of the building. When temperature in a specific zone falls below setpoint, the control valve for that zone opens, permitting flow to the radiant panels. Each panel is equipped with an adjustable balance valve which has been set to maintain design flows when the control valve is opened.

-Entrance Heaters: Fan-powered unit heaters are installed in the entryways and vestibules. Flow control is provided via an aquastat to actuate the flow control valve, and a thermostat to control the fan. Each unit is equipped with an adjustable balance valve which has been set to maintain design flows when the control valve is opened.

Building Control Systems:

A complete building control system has been installed by SIEMENS Building Controls. This system uses a front-end control computer located in the building manager/security office. It incorporates the latest technology in digital control systems.

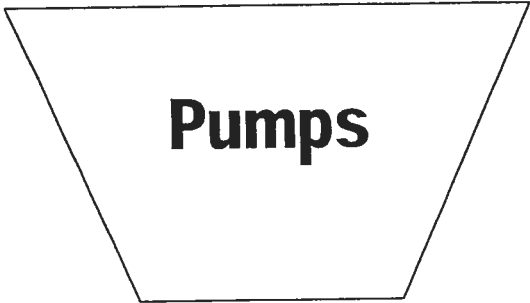
Control documentation should be consulted for specific sequences, applications, and methods.

HYDRONIC SYSTEMS



Test and Balance Company

HYDRONIC SYSTEMS



Pumps



Test and Balance Company

PUMP TEST REPORT

PROJECT: Idaho Water Center

UNIT DATA		P-1	P-2	P-3	P-4
DESIGN	Location	Garage Level Mechanical Room	Garage Level Mechanical Room	Garage Level Mechanical Room	Garage Level Mechanical Room
	Service	Heating Water	Heating Water	Chilled Water	Chilled Water
	Manufacturer	Taco	Taco	Taco	Taco
	Model No.	KV4009	KV4009	KV3013	KV3013
	Serial No.	2841107	2841107	2841107	2841107
	GPM / ft. head	295 / 70	295 / 70	300 / 127	300 / 127
	Req NPSH	7 FT	7 FT	10 FT	10 FT
	Pump RPM	1760	1760	1760	1760
	Impeller Dia.	8.8	8.8	12.13	12.13
	Motor Manufacturer	Baldor	Baldor	Baldor	Baldor
	Motor HP / RPM	10 / 1760	10 / 1760	20 / 1765	20 / 1765
	Volts/Ph/Hz	430 / 3 / 60	430 / 3 / 60	460 / 3 / 60	460 / 3 / 60
	F.L. Amps / S.F Amps	12.7 / 1.15	12.7 / 1.15	23.5 / 1.15	23.5 / 1.15
ACTUAL	Pump Off Pressure	40 PSI	40 PSI	47PSI	47PSI
	Valve Shut Diff.	76 FT	76 FT	156 FT	156 FT
	Actual Imp. Dia.	8.8"	8.8"	12.15	12.15
	Valve open Diff.	69 FT	69 FT	115 FT	115 FT
	Valve open GPM	340	340	355	355
	Final Discharge Press.	166 FT	166 FT	198 FT	196 FT
	Final Suction Press.	96 FT	96 FT	71 FT	69 FT
	Final ΔP	70 FT	70 FT	127 FT	127 FT
	Final GPM	295	295	325	325
	Volts	477 / 478 / 477	478/477/480	478 / 477 / 477	478 / 476 / 478
	Amps	9.7 / 9.9 / 9.8	10.1 / 10.2 / 10.1	18.1 / 18.0 / 18.0	19.6 / 19.7 / 19.7

Test Date: June 2004

Readings By: David Kirkham

PUMP TEST REPORT

PROJECT: Idaho Water Center

SYSTEM: 24 / 7

UNIT DATA		P-7			
DESIGN	Location	Mechanical Room			
	Service	24/7			
	Manufacturer	Taco			
	Model No.	KV2009 AE			
	Serial No.	288359			
	GPM / ft. head	69 / 61			
	Req NPSH	8 FT			
	Pump RPM	1770			
	Impeller Dia.	7.8"			
	Motor Manufacturer	Baldor			
	Motor HP / RPM	5 / 1750			
	Volts/Ph/Hz	460 / 3 / 60			
	F.L. Amps / S.F Amps	6.5 / 1.15			
ACTUAL	Pump Off Pressure	30 PSI			
	Valve Shut Diff.	69 FT			
	Actual Imp. Dia.	7.8"			
	Valve open Diff.	62 FT			
	Valve open GPM	68			
	Final Discharge Press.	156 FT			
	Final Suction Press.	94 FT			
	Final ΔP	62 FT			
	Final GPM	68			
	Volts	488 / 487 / 488			
	Amps	3.6 / 3.7 / 3.8			

Test Date: November 2004

Readings By: David Kirkham

Environmental Engineers, Inc.

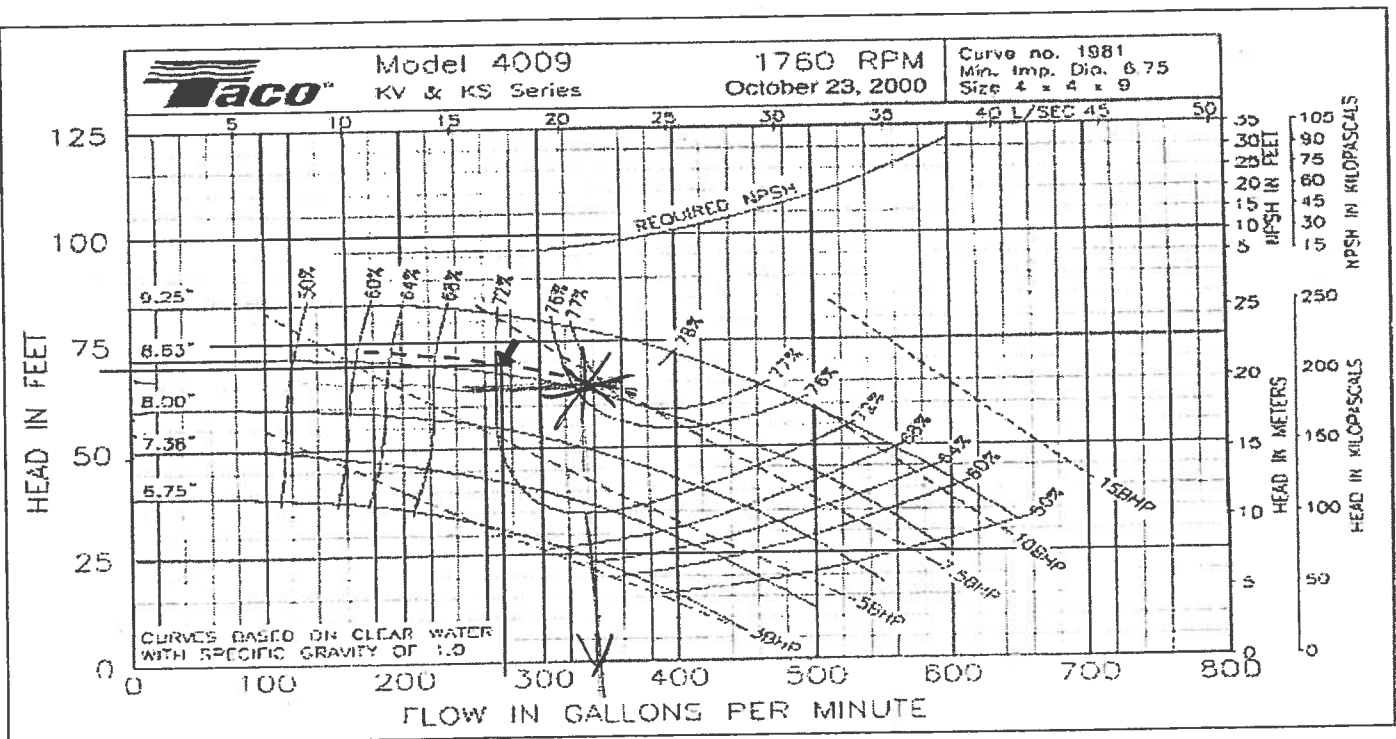
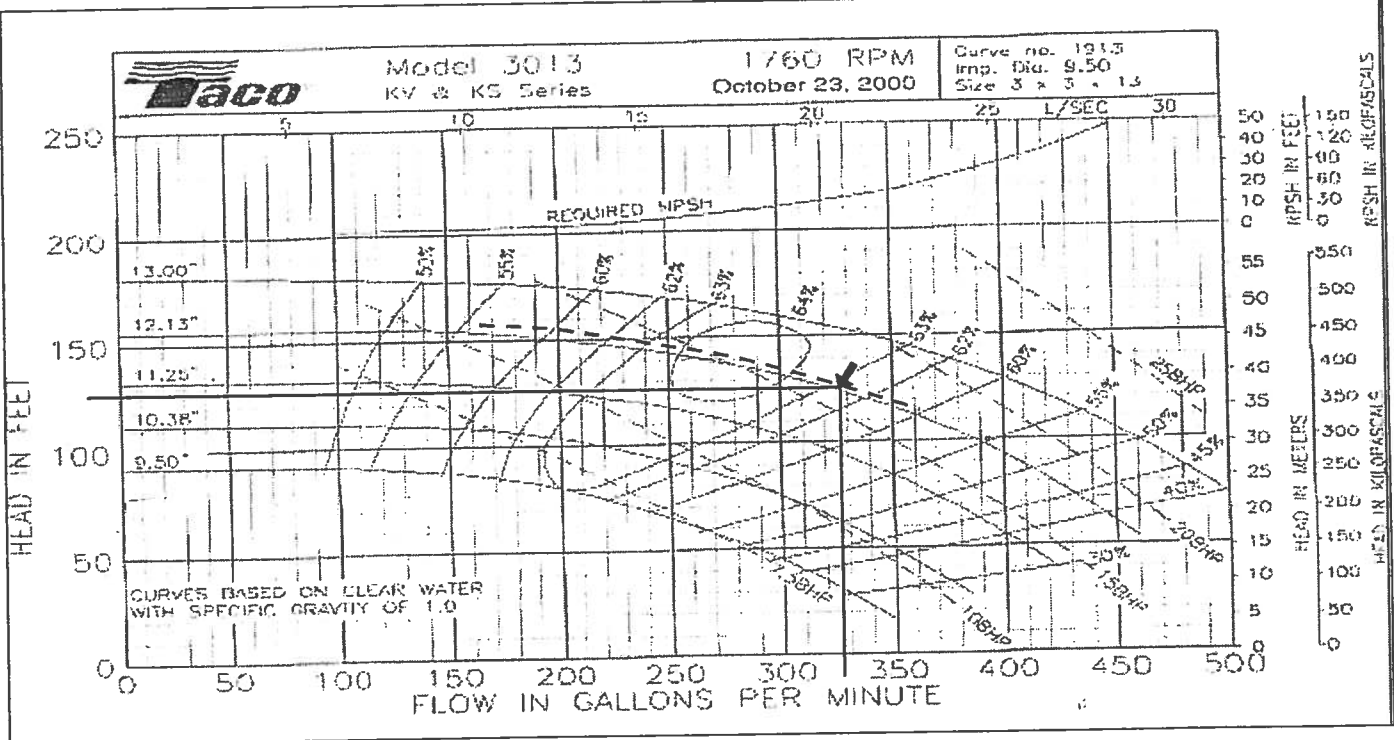
A Test and Balance Company



DEE RICE P.E.

TAB SUPERVISOR
BOB RICE

PUMP TEST REPORT





This curve is for the pump on the 24/7 circuit.

HEAT EXCHANGER/CONVERTER TEST REPORT

PROJECT: Idaho Water Center

UNIT DATA	HE-1	HE-2	HE-3
Location	Mechanical Room	Mechanical Room	Mechanical Room
Service	HWS	HWS	24 / 7 Cooling
Manufacturer	Tranter	Tranter	Tranter
Model Number	GXD-042-M-5-HP-253	GXD-042-M-5-HP-253	GCD-016-J-5-HP-60
Serial Number	SH346	SH345	SH748

TEST DATA	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL
STEAM						
Pressure, PSI (Kpa)						
Flow, Lbs/Hr (Kg/s)						
PRIMARY WATER						
Ent / Lvg Temp	165 / 115	170 / 130	165 / 115	171 / 134	62 / 82	59 / 62
Temp ΔT	50	40	50	37	20	3
Ent / Lvg Pressure	NS	62 / 50	NS	68 / 30	NS	44 / 24
Pressure ΔP (PSI)	4	12	4	38	6	20
Flowrate (GPM)	270	N/A	270	N/A	69	N/A
SECONDARY WATER						
Ent / Lvg Temp	110 / 160	133 / 164	110 / 160	133 / 153	87 / 67	66 / 63
Temp ΔT	50	31	50	20	20	3
Ent / Lvg Pressure	NS	53 / 51	NS	45 / 48	NS	N/A / 40
Pressure ΔP (PSI)	4	2	4	3	8	N/A
Flowrate (GPM)	270	340	270	340	69	65

Test Date: November 2004

Readings By: David Kirkham

HYDRONIC SYSTEMS

Balancing Valves



Test and Balance Company



Environmental Engineers, Inc.

A Test and Balance Company



DEE RICE P.E.

TAB SUPERVISOR
BOB RICE

BALANCE VALVE TEST REPORT

PROJECT: Idaho Water Center

MANUFACTURER: Taco

SYSTEM: AHU's
CW

AH	MODEL	SIZE	DESIGN GPM	ACTUAL VALVE SETPOINT	ACTUAL VALVE ΔP	ACTUAL GPM	NOTES
AHU-1-1	Accu-Flo	1-1/2"	31.5	13	65	32.0	
AHU-1-1	Accu-Flo	1-1/2"	31.5	11	60	32.0	
AHU-1-1	Accu-Flo	1-1/2"	31.5	13	65	32.0	
AHU-1-1	Accu-Flo	1-1/4"	31.5	6	120	31.5	
AHU-1-1	Accu-Flo	1-1/4"	31.5	5	118	31.0	
AHU-1-1	Accu-Flo	1-1/4"	31.5	5	119	31.5	
AHU-2-1	Accu-Flo	1-1/4"	22.8	7	72	22.5	
AHU-2-1	Accu-Flo	1-1/4"	22.8	8	74	23.0	
AHU-2-1	Accu-Flo	1-1/4"	22.8	7	73	22.5	
AHU-2-1	Accu-Flo	1-1/4"	22.8	8	74	23.0	
AHU-2-1	Accu-Flo	1-1/4"	22.8	8	75	22.5	
AHU-2-1	Accu-Flo	1-1/4"	22.8	7	74	22.5	
AHU-3-1	Accu-Flo	1-1/4"	20.2	13	79	23.0	
AHU-3-1	Accu-Flo	1-1/4"	20.2	11	68	20.5	
AHU-3-1	Accu-Flo	1-1/4"	20.2	10	70	20.0	
AHU-3-1	Accu-Flo	1-1/4"	20.2	13	70	20.5	
AHU-3-1	Accu-Flo	1-1/4"	20.2	13	78	20.0	
AHU-3-1	Accu-Flo	1-1/4"	20.2	13	77	20.0	
AHU-4	Accu-Flo	1-1/4"	6.0	27	20	6.0	
AHU-5	Accu-Flo	2"	24.0	15	11	24.5	
AHU-6	Accu-Flo	1-1/4"	7.0	25	22	7.0	
AHU-7	Accu-Flo	1-1/4"	10.0	20	32	10.0	

3
2
1

SF

6
5
4

Test Date: June 2004

Readings By: David Kirkham



REV - 11/04

SUBJECT EQUIPMENT: Pump P-7

24/7 cooling loop pump

Reference	Specifications	Site Equipment Data Verification by Contractor	Systems Verified by Commissioning Agent
Pump Type:	<u>Vertical In-Line</u>	<u>✓</u>	
Service:	<u>Condenser Water</u>	<u>✓</u>	
Location:	<u>Basement Mech Room</u>	<u>✓</u>	
Capacity (GPM):	<u>69</u>	<u>69</u>	<u>68</u>
Liquid Temp (°F)	<u>67</u>		
Diff. Pressure (Ft.):	<u>61</u>	<u>61</u>	<u>62</u>
Minimum Efficiency (%):	<u>(high efficiency)</u>		
Impeller Diameter (In):	<u>N/A</u>	<u>7.8"</u>	
Pump Speed (rpm):	<u>1800</u>	<u>1756</u>	
Motor Power (HP):	<u>5</u>	<u>5</u>	
Volts/Phase/Hz:	<u>480/1/60</u>	<u>460/3</u>	
Manufacturer:	<u>Armstrong</u>	<u>TACO</u>	
Model No.:	<u>2x2x8</u>	<u>KV2009AE2/CB690M</u>	
Series:	<u>4380</u>		
Comments/Notes: _____ _____ _____ _____		Contractor Sign Off: Name: <u><i>[Signature]</i> RM</u> Date: <u>8/21/24</u>	
Project Name and Location IDAHO WATER CENTER BOISE IDAHO		Form COMMISSIONING START-UP CHECK SHEET	

SUBJECT EQUIPMENT: Heat Exchanger HE-3

[illegible]

Comments/Notes: _____

Contractor Sign Off:

Name: David S. R. M.

Date: 8/27/04

Project Name and Location

**IDAHO WATER CENTER
BOISE IDAHO**

Form

COMMISSIONING START-UP CHECK SHEET

SUBJECT EQUIPMENT: Chiller (CH-1)

Reference	Specifications	Site Equipment Data Verification by Contractor	Systems Verified by Commissioning Age
Service:	Chilled Water	✓	
Location:	Basement Mech Room	✓	
Manufacturer:	Trane	TRANE	
Model No.:	CHVF	CHVF049FAZDOAC 32556PAE6NDG	
Volts/Phase/Frequency:	480/3/60	460/3/60	
Capacity (tons):	480	SEE SUBMITTAL NOT ON NAME PLATE	
C W Flow (GPM):	638 Building side		
C W EWT (°F):	63		
C W LWT (°F)	45		
Chilled Water P.D. (Ft.):	11.7		
Cond W Flow (GPM):	650 CW side		
Cond W EWT (°F)	61		
Cond W LWT (°F)	81		
Cond W P.D. (Ft.):	9.45		
Compressor Input (Kw.):	208		
Comments/Notes:		Contractor Sign Off:	
		Name: <u>[Signature] RM</u>	
		Date: <u>8/27/09</u>	
Project Name and Location		Form	
IDAHO WATER CENTER BOISE IDAHO		COMMISSIONING START-UP CHECK SHEET	



The Trane Company
Rocky Mountain District

TRANE

Air Conditioning, Heating, and
Energy Management

Trane Authorized Warranty Service

Denver

Phone: 303-228-3300
Fax: 303-228-2828
Toll Free: 1-800-729-9115

Colorado Springs

Phone: 719-599-3900
Fax: 719-268-0200

Fort Collins

Toll Free: 1-877-652-93
Phone: 970-490-1052
Fax: 970-490-1191

Cheyenne Wyoming

Toll Free: 1-877-652-9316

Grand Junction

Toll Free: 1-888-323-1884
Phone: 1-970-242-4361
Fax: 1-970-242-4566

Salt Lake City

Phone: 801-486-0500
Toll Free: 1-800-288-7
Fax: 801-486-0752

Boulder

Phone: 303-527-0677
Fax: 303-527-0845

Work Order # S4E:4311
Job Name Idaho Water Center
Job Contact Dan McCosy

Technician Kurt Wynn
Job Address 190 E. Front Street. Boise
Phone # 345-2056

Equipment Brand Trane
Model Number CVHF049
Serial Number L03G06179

Action Taken Start up on a CVHF, Dumped nitrogen holding charge it was a 4 psi. Put vacuum on system + pulled down to 450 micron, let it do a stand test, microns never rises. Started Evap + Condenser pump + charged 890 lbs of R123. Went threw electrical + tightened up, phased chiller ABC. Went threw program + set up per specs. Enabled External Water, Made sure Seimens was giving me water setpoint, Auto Start. Started + ran chiller logged chiller out.

* Condenser is well water, valve is not set up for
Recommendations 81° leaving water once VFD's are programmed
Seimens will get the valve working, water balance needs to be done also. Once build. is turned over
Owner training needs to be done.

Date	Labor		Travel		Miles Driven
	Regular	Overtime	Regular	Overtime	
6-1	6				
6-2	8				

Qty.	Material	Vendor PO#	Truck Stock	Wmty.
890	R123			
2	Truck Misc		✓	

Job Complete ☒ Premises Clean & Neat Page 1 of 1

Mark Stewart
Customer Signature

Kurt Wynn
Technician Signature

6-2-04
Date


TRANE

TRANE
**CenTraVac®
Checksheet and Request for Serviceman**

To: _____ Trane Service Company

 S.O. No.: B3U082A

 Serial No.: LO3G06179

 Job/Project Name: Water Center

The following items are being installed and will be complete by _____

1. CenTraVac

 In place and piped. Do not insulate CenTraVac or adjacent piping. The contractor is responsible for any foreign material left in the unit. ☒
2. Piping

Chilled water piping connected to:

 CenTraVac ☒
 Air handling units ☒
 Pumps ☒

Condenser and heat recovery condenser (as applicable) piping connected to:

 CenTraVac ☒
 Pumps ☒
 Cooling tower ☐
 Heating loop ☐

 Make-up water connected to cooling tower ☐
 Water supply connected to filling system ☒
 Systems filled ☒
 Pumps run, air bled from system ☒
 Strainers cleaned ☐
3. Flow Balancing Valves Installed

 Leaving chilled water ☒
 Leaving condenser water ☒
 Heat recovery condenser leaving water ☐
4. Wiring

 Compressor motor starter has been furnished by or approved by The Trane Company, La Crosse, WI. ☒
 Power available ☒
 Interconnecting wiring, starter to control panel ☒
 External interlock (flow switches, water pump aux., etc.) ☒
Motors connected on:

 CenTraVac* ☒
 Chilled water pump ☒
 Cooling tower fan rotation checked ☒
 Condenser water pump ☒
 Heat recovery condenser water pump (as applicable) ☐
 Power available for Service tools 115 VAC (115V AC) ☒
 All controls installed and connected ☒
 All magnetic starters installed and connected ☒

*NOTE: Do not make final connections to compressor motor until requested by Trane Service Representative.

5. Testing

 Dry nitrogen available for pressure testing ☒
 Trace gas amounts of Refrigerant-22 available for leak testing, if necessary ☒
6. Refrigerant On Job Site ☒
7. Gauges, Thermometers and Air Vents

 Installed on both sides of evaporator ☐
 Installed on both sides of condenser and heat recovery condenser (as applicable) ☐
8. System Can Be Operated Under Load Conditions ☒
9. Electrician, Control Man and Contractor's Representative Are Available to Evacuate, Charge and Test the CenTraVac under Serviceman's Supervision ☒

In accordance with your quotation and our purchase order number _____

We will therefore require your serviceman on the job by** _____

This is to certify that the CenTraVac(s) has been properly and completely installed and the applicable items listed above have been completed.

**Advance notification is required to allow scheduling of the start-up as close to the requested date as possible.



Compliance To ASHRAE Standard 15

- Yes ☒ No ☐ 1. Is this an outdoor installation? If yes, skip to "Owner Awareness of Safe Refrigerant Handling Procedures".
- ☒ Yes ☐ No 2. Does the equipment room have a refrigerant monitor/sensor capable of monitoring and alarming within the acceptable exposure level (AEL) of the refrigerant?
- ☒ Yes ☐ No 3. Does the equipment room have an audible or visual alarm (other than the light on the monitor) which is controlled by the monitor?
- ☒ Yes ☐ No 4. Does the equipment room have mechanical ventilation?[†]
- Yes ☒ No ☐ 5. Is a self-contained breathing apparatus required by local building code? If no, go to question 7.
- Yes ☐ No ☐ 6. Is a self-contained breathing apparatus available in close proximity of the equipment room?
- ☒ Yes ☐ No 7. Are the purge discharge and the rupture disk piped to the outdoors?

[†] The mechanical ventilation consists of two flow requirements i.e., a two-speed fan where the high speed is sized by the formula $Cfm = 100 \times \text{the square root of the pounds of refrigerant of the largest chiller}$, and low speed is 0.5 Cfm per square foot of the equipment room space. (This requirement is for chillers located within the building which is the most common.)

Owner Awareness Of Safe Refrigerant Handling Procedures

- ☒ Yes ☐ No 1. Has the owner been fully instructed on the proper use of refrigerant 123?
- ☒ Yes ☐ No 2. Was the owner given a copy of the MSDS for HCFC-123?
- ☒ Yes ☐ No 3. Was the owner given a copy of Refrigerant Handling Guidelines?

Additional time required to complete the start-up and adjustment due to incompleteness of the installation will be invoiced at prevailing rates.

Serial Number _____

Serial Number _____

Serial Number _____

Serial Number _____

Serial Number _____

Checklist Completed By: Kurt Wynn

Signed: [Signature]

Dated: 6-1-04

Notice To Trane Service Agency:

A copy of this completed form must be submitted to the CenTraVac Technical Service Department in La Crosse, WI, prior to the actual start-up date.


TRANE®

CENTRAVAC COMMISSIONING CHECKLIST AND START-UP TEST LOG

Job name Tahoe Water Center
 Model # CV4F049
 Sales Order # B3U082A

Location Boise Id.
 Serial # LO3G-06179
 Start-up Date 6-2-04

NOTE: The Unit Installation, Operation and Maintenance Manuals including Warnings and Cautions, Applicable Service Alerts and Bulletins, Submittals, and Design Specifications must be used in conjunction with this checklist.

I. PRECOMMISSIONING PROCEDURES

A. Obtain Installation Check Sheet

This must be prepared by installer for a particular unit, verifying the unit is ready for commissioning.

B. Obtain Design (order) Specification Data

This indicates the design criteria of the particular unit. A unit cannot be properly commissioned unless this data is known. It is the responsibility of the selling office to furnish this data.

C. Obtain Wiring Diagrams

The "as-wired" electrical diagram should be compatible with the recommended Trane submittals and diagrams. Are customer added external/remote control circuits compatible? ☒ Yes ☐ No

D. General Installation Observations

☐ 1. Is there any apparent shipping or rigging damage? ☐ Yes ☒ No

☐ 2. Record the unit pressure upon receipt: 4 psig. If there is no pressure, a leak test will have to be done before the unit can be evacuated and charged.

☐ 3. Is the water piping correctly installed? ☒ Yes ☐ No

Flow Switches	☒ Yes	☐ No	Pressure Gauges	☒ Yes	☐ No
Isolations Valves	☒ Yes	☐ No	Flow Balancing Valves	☒ Yes	☐ No
Thermometer Wells	☐ Yes	☐ No	Vent Cocks and Drains	☒ Yes	☐ No

☐ 4. Have proper clearances around the unit been maintained per submittal and/or Installation

Are there Manual guidelines available? ☒ Yes ☐ No

☐ 5. Is power wiring of adequate ampacity and correct voltage?

Are fuses or circuit breakers of the correct value or type?

☒ Yes ☐ No
☒ Yes ☐ No

☐ 6. Is the unit base acceptable, level, and is the unit on isolators (rubber as supplied by Trane or spring type)? ☒ Yes ☐ No

☐ 7. Have the low voltage circuits been properly isolated from the higher voltage control and power circuits? ☒ Yes ☐ No

E. Comments



II. COMMISSIONING PROCEDURES

A. Pre-start Operations

1. Holding Charge

- ☒ 4 psig. Must be positive pressure or leak test must be done.
- ☒ Before relieving the holding charge, calibrate the H.P.C. high-pressure control.
This is a check of pressure to the H. P. C. as well as calibration of the control.
Disconnect and cap the flare. Calibrate H.P.C. reconnect flare.
- ☒ Relieve the holding charge.

2. Calibration of High Pressure Cutout. This control is factory set and locked. Do not adjust unless necessary. Field replacement are also factory set prior to shipment.

3. Megohm the Motor (500 volt Meggar)

- ☐ Compressor motor Megohms – refer to temp/resistance chart for acceptable values. Remove surge suppressors before Megging. Never Meg test with the unit in a vacuum.

T1 to Earth _____
T2 to Earth _____
T3 to Earth _____

T4 to Earth _____ T1 to T2 _____
T5 to Earth _____ T1 to T3 _____
T6 to Earth _____ T2 to T3 _____

T1 to T4 _____
T2 to T5 _____
T3 to T6 _____

4. Evacuation

Connect the vacuum pump to start evacuation. Use a 2-stage pump with at least 5 CFM capacity
Connect to the evaporator-charging valve with a hose no smaller than ¼ inch ID.

- a. For the IT Cutler-Hammer Solid State Starter it is necessary to shut off all power to the unit prior to evacuating the chiller. The IT starter has terminals 4, 5 & 6 hot when the unit is off. Failure to shut off power to the chiller, with the vacuum pump hook up, will cause a motor failure.

5. Condenser

- ☒ Isolation and flow valves installed.
- ☒ Calibrated thermometers and pressure gauges installed in/out condenser on machine side of any valve or elbow.
- ☒ If condenser pump controlled by UCP, is field wiring correct and complete?
- ☒ Condenser pump(s) run, system and strainers properly cleaned and/or flushed.
- ☒ Condenser water strainer in close proximity to entering connection of condenser.
- ☐ Previsions installed to properly maintain water treatment additives.
- ☐ Initial water treatment added to system.
- ☒ Flow or differential pressure switch installed and where possible, wired in series with auxiliary of pump motor starter. Verify correct operation of flow proving circuit.
- ☒ Condenser water flow balance. PSID design 9.46 PSID actual _____
GPM design 650 GPM actual 380

4-20



STARTUP Test Log Water Cooled CenTraVac With CH530 Controller

Job Name <u>Water Center</u>	Serial # <u>L03C06179</u>
Job Location <u>Boise Idaho</u>	Model # <u>CVHFO49FA2DOAC32556</u>
Sales Order # <u>B3U082A</u>	Ship Date _____
Elevation <u>2500</u>	Start Date <u>6-2-04</u>

DATE: _____

Starter Data:

Manufacturer	<u>Eaton</u>
Type	<u>Y-Delta</u>
Vendor ID#	<u>RCTR03681-A</u>
Model #	<u>CVSK0298FAAD000000-00</u>
Volts 7 Hz	<u>LRAD 2598</u>
Amps	<u>208 to 346</u>

Current**Transformers**

Primary	<u>X 13580269 -05</u>
Primary	<u>X 13580269 -05</u>
Primary	<u>X 13580269 -05</u>
Secondary (if present)	<u>X _____ -</u>
Secondary (if present)	<u>X _____ -</u>
Secondary (if present)	<u>X _____ -</u>

Motor Data:

Manufacturer	<u>Trane</u>
Type & Frame	<u>C9HA400</u>
Drawing#	<u>K1661-35B</u>
Serial#	<u>00VKQ6412784-A16F</u>

Nameplate Data

RLA	<u>298</u>
KW	<u>211</u>
Volts & Hz	<u>460 - 60</u>

Machine Press

At Arrival	<u>PSIG</u>
At Startup	<u>4 PSIG</u>
Leak Test Vacuum	<u>450 Microns</u>
Vac Rise Test	<u>_____ Microns</u> after _____ hours
Unit Refrigerant Charge	<u>890 lbs of</u> R- ~~410A~~ <u>123</u>
High Pressure Cutout	<u>HPC (3S1)</u> <u>15 Open</u> <u>HPC (3S1)</u> <u>11 Close</u>

Design Data

RLA	<u>297.8</u>
KW	<u>211</u>
Volts & Hz	<u>460 - 60</u>
Evap Flow	<u>637</u> Actual
Evap PD	<u>11.7</u>
Cond Flow	<u>650</u>
Cond PD	<u>9.46</u>

Dyna View Display Settings:

Date Format	<u>mm DD, Y/YY</u>
Date	<u>Jun 2, 2004</u>
Time Format	<u>12 hour</u>
Time of Day	<u>8:13 AM</u>
Keypad/Display Lockout	<u>Disable</u>
Display units	<u>English</u>
Pressure Units	<u>Gauge</u>
Language	<u>English</u>

Dyna View Purge Settings

Purge Operating Mode	<u>Adaptive</u>
Daily Pumpout Limit	<u>10 min</u>
Pumpout Limit Disable	<u>0</u>
Purge Liquid Temp Inhibit	<u>Enable</u>
Purge Liquid Temp Limit	<u>48°</u>
Purge Run Time	<u>17:45</u>

Notes



6. Evaporator

- ☒ 4 psig. Must be positive pressure or leak test must be done.
- ☒ Calibrated thermometers and pressure gauges installed in/out of evaporator on machine side of any valve or elbow.
- ☒ If evaporator pump controlled by UCP, is field wiring correct and complete?
- ☒ Evaporator pump(s) run 24 hrs. System and strainers properly cleaned and/or flushed.
- ☒ Evaporator water strainer in close proximity to entering connection of evaporator.
- ☒ Provisions installed to properly maintain water treatment additives.
- ☒ Initial water treatment added to system.
- ☒ Flow or differential pressure switch installed and where possible, wired in series with auxiliary of pump motor starter. Verify correct operation of flow proving circuit.
- ☒ Evaporator water flow balanced. PSID design 11.7 PSID actual 11.7
GPM design 637 GPM actual 630

7. Electrical and Controls

a. Motor starter panel

- ☒ All terminals tightened.
- ☒ Wiring free from abrasion, kinks and sharp corners.
- ☒ Contactors and relays have freedom of movement.
- ☒ All contacts are free of corrosion or dirt. Panel is free of dust, debris etc.
- ☒ Check the ratio of the current transformers. Record the part #s on the start-up log.
- ☐ Use only twisted shielded pair for the IPC circuit between the starter and the UCP on remote starters. Recommended wire is Belden 8760, 18 AWG. Polarity is critical.
- ☒ The low voltage IPC link (☐ 30 volts) must be in a separate conduit from the 115-volt wiring.
- ☒ IPC link routing within the starter panel must stay a minimum of 6 inches from higher voltages.
- ☒ Remote starter to UCP connections are complete and comply with Trane requirements. Verify oil pump interlock circuit to 1a7-J2-4 and J2-2.
- ☒ Check the correctness of the power connections from the starter to the motor.
- ☒ Check the wiring to the starter for size, voltage and correct phase rotation (A-L1, B-L2, and C-L3).
- ☒ Check the equal phase representation in each power-wiring conduit.



a. Control panel

- ☒ All terminals tightened.
 - ☒ Wires free from abrasion, kinks and sharp corners.
 - ☒ Low voltage wires are isolated from high voltage wires.
 - ☒ Panel is free of debris, dust etc.
 - ☒ "Power up" the control panel. (Non-AFD Starters)
 1. Starter disconnect locked open.
 2. Fuse 2F4 must be removed from the starter.'
 3. Connect auxiliary 115VAC-power cord to Terminals 1X1-5(L1) and 1X1-17(L2) in the starter panel. MAKE SURE OF THE POLARITY. THE 'HOT' SIDE MUST BE CONNECTED TO TERMINAL 1X1-5(L1) AND THE 'NEUTRAL' SIDE TO 1X1-17(L2).
 4. Plug in cord to 115VAC-power source. Control panel is now energized.
 - ☒ Record the configuration and setpoints of the CH530 control system, using Service Tool.
 - ☒ Using the unit nameplate data and the order specification, double check and reset, if required, the settings of RLA & STMS, using Service Tool.
- If Evaporator and condenser water pumps are controlled by the UCP, use the DynaView (or Service Tool) manual override menu to manually start and test the control of the pumps.
- ☒ Check the setting of the oil pressure-regulating valve.
 1. Use the DynaView manual override of the UCP to manually start the oil pump.
 2. Proceed to the Compressor Report menu and observe the Differential Oil Pressure
 3. Adjust the oil pressure-regulating valve to maintain 12 to 18 psid. The oil pressure-regulating valve may require adjustment as the unit is started.
 4. This procedure also checks to ensure correct sensing of oil pressure. The Oil Pressure Cutout setting is adjustable within via the CH530 Service Tool.
 5. Return Oil Pump control to 'auto' from within the DynaView.
 - ☒ Check vane operator and vanes (Service Tool).
 1. Use the Service Tool manual override menu to manually override the vane control.
 2. Enter targets from 0% to 100% and observe vane operation. At minimum and maximum travel the operator should not exert any force on the vane assembly, adjust as required.
 3. Vane movement is smooth to open/close.
 4. Vane movement is reported back to the UCP.
 5. Return Vane control to 'auto'.
 - ☒ Dry run the starter (Service Tool).
 1. Make sure the starter disconnect is safety locked open.
 2. Use the Service Tool menu of the UCP to initiate the Starter Dry Run.
 3. Observe correct operation of starter contactors.
 4. Observe correct operation of transition complete signal (if required).
 5. Disable Starter Dry Run when complete.
 - ☒ Remove Power.
 - ☒ Disconnect and remove the temporary power cord.



B. Preparation for Start-up.

1. Evacuation and charging

- ☒ Evacuation leak test. When vacuum has been drawn down to 500 microns to 1000 microns, secure the vacuum pump. Wait for 12 hours for a valid vacuum leak test. If the rise in vacuum is less than 500 microns per 12 hours, start-up may proceed.
- ☒ Charge refrigerant. **MAKE SURE THE CHILLED WATER IS FLOWING THROUGH THE EVAPORATOR.** Charge the prescribed amount of refrigerant through the liquid charging valve at the liquid inlet to the evaporator. Check that all drums contain a full amount of refrigerant. Amount charged 890 lbs and kg.

2. Electrical

- ☒ Disconnect all temporary power cords, replace all fuses, connect motor leads, make final electrical inspection.
- ☒ Power up the motor starter. Check for control voltage at control panel terminals 1X1-1 and 1X1-17. 125 Volts
- ☐ Check current to the oil sump heater. 11 Amperes
- ☒ As the oil heats up, finish any operations not yet completed in preparation for starting the unit.

C. Chiller Start-up

1. Make all preliminary checks.

- ☒ Oil temp, oil level, chilled water flow, chilled water load available (cooling units on) etc.

2. Start the unit.

- ☒ If the phase rotation of the electrical power has not been positively confirmed, the actual rotation of the motor must be checked. Observe the rotation of the motor shaft through the sight glass on the end of the motor at the moment of start-up. Rotation must be **CLOCKWISE**. If the phase sequence is incorrect, confirmed by observation of the Phase Reversal diagnostic on the UCP, then the incoming power leads to the starter must be adjusted by authorized personnel.
- ☒ As the unit starts and runs, observe closely all operating conditions.
- ☒ Adjust the oil pressure regulator if necessary to 12 to 18 psi net.
- ☒ In the DynaView Purge Settings menu of the UCP, place the Purge Operating Mode to 'on' to allow the removal of non-condensables. It may also be necessary to disable the Purge Pumpout Limit timer found in the Purge Setting menu.
- ☒ After the unit has the system down to design leaving chilled water temp and is under control, and the purge is no longer relieving non-condensables, begin taking the start-up test log. Log the unit a minimum of 3 times at 15-minute intervals.
- ☒ In the DynaView Purge Settings menu of the UCP, return the purge-operating mode to 'Adaptive'.
- ☒ Restart the chiller and carefully observe the starting and loading sequence.



3. Instructions to the Chiller Operator.

☒ Instructions for starting, operating, and shutting down.

☒ Instructions for logging the unit.

☒ Instructions for periodic maintenance.

D. After 2 weeks of operation (International Units Only)

1. Remove the water box covers on both the evaporator and condenser. Mechanically brush clean all the tubes. This is to assure there is no debris blocking any of the tubes. A piece of debris partially blocking a tube may cause that tube to fail prematurely.

2. Replace the oil filter with the spare oil filter included in the control panel at time of shipment.

E. Comments and/or Recommendations:

Kurt Wynn
Service Technician

[Signature]
Signature

6-1-04
Date



STARTUP Test Log Water Cooled CenTraVac With CH530 Controller

Dyna View Reports

	Log 1	Log 2	Log 3
Evaporator			
Entering	63.4	54	53.2
Leaving	51	43.8	44
Saturated	47.9	42.7	43
Refrig Press	-6.4	-7.2	-7.2
Approach	2.9	1.2	1.0
Flow Sw status	Flow	Flow	Flow
Condenser			
Entering <i>Temp?</i>	58.9	58.8	58.8
Leaving	82.4	79.3	77.5
Saturated	81.7	78.5	77.3
Refrig Press	1.2	.1	0
Approach	-1.6	-1.6	-1.2
Flow Sw status	Flow	Flow	Flow
Compressor			
Starts	3	6	6
Running Time	1:20	1:13	2:05
Oil Tank Press	-6.4	-7.3	-7.4
Oil Dischrg. Press	20.8	18.7	18.4
Oil Diff Press	27.6	26.1	25.8
Oil Tank Temp	116.5	114.9	115.4
IGV Position %	1290	9.5	1290
IGV Steps	5960	4684	6022
Motor			
% RLA L1, L2, L3	55, 57, 55	51, 51, 54	54, 54, 56
Amps L1, L2, L3	126, 126, 132	154, 153, 161	159, 160, 168
Volts AB, BC, CA	480, 482, 480	483, 485, 483	480, 483, 481
Power KW	45	80	90
Load PF	.422	.601	.644
Winding #1 temp	101.4	104.1	100.6
Winding #2 temp	104.6	108.4	101.8
Winding #3 temp	97.9	109.1	101.7
w/AFD only:			
AFD Freq			
AFD Speed			
AFD Transistor temp			
Purge			
Time Until Next Purge Run	—		
Daily Pumpout — 24 hrs.	23 min	0	0
Avg. Daily Pumpout — 7 days	3 min	5 min	5 min
Daily Pumpout Limit/Alarm	50 min	10 min	30 min
Chiller On 7 days	0	190	190
Pumpout Chiller On 7 days	22%	29%	29%
Pumpout Chiller Off 7 days	78%	71%	71%
Pumpout- Life	55 min	65	65
Purge Rfgr Cprsr Suction Temp.	54.3	51	49
Purge Liquid Temp.	62.6	73.4	77.2
Carbon Tank Temp,	73.0	75	75.5
Date: 6-2-04			
Technician: <i>[Signature]</i>			
Owner: <i>[Signature]</i>			