MONTANA STATE UNIVERSITY

FACILITIES PLANNING, DESIGN & CONSTRUCTION
Sixth Avenue and Grant Street • P.O. Box 172760 • Bozeman, Montana 59717-2760
Phone: (406) 994-5413 • Fax: (406) 994-5665

REQUEST FOR PROPOSAL

Project Title: Cooley Laboratory Renovation
Location: Montana State University

PPA No.: 10-0023
RFP No.: 40
Date: 04/12/12

To: Dick Anderson Construction
4498 Jackrabbit Lane
Bozeman, MT 59718

Attention: Platisha

From: Cecilia Vaniman, Project Manager
Cooley Lab Renovation
Montana State University

Attention:

In order to expedite the Work and avoid or minimize delays in the Work the following proposal is requested. Please return a response by: 04/19/12

Date Sent: 04/12/12
Date Received:

RFP Provide EDDY CURRENT TESTING for Chiller

Reference Drawings: N/A

Reference Specifications: N/a

Please provide Eddy Current Testing for the Centrifugal Water Chiller Evaporative Tubes and Condenser Tubes as described In the attachment..

Attachment: McQUAY Centrifugal Chiller Specifications

Eddy Current Testing Procedure

This RFP is for pricing purposes only. The contractor shall not proceed with the scope of work described within until pricing is approved by the owner in writing.

Distribution:
- ☐ Owner
- ☐ Agency
- ☒ Architect
- ☒ Contractor
- ☐ Engineer
- ☐ Other

TEST PROCEDURE

A probe is manually drawn the length of the sample/specimen at a constant rate of speed, "Normally averaging 80 feet per minute". Impulses are then fed back from the probe coil to the receiving console which displays the tube's condition on an oscilloscope screen.

The equipment used is an impedance bridge. The inductive legs of the bridge are a primary and secondary coil encased within the probe. An A/C current is applied to the primary coil and generates a magnetic field, this field causes eddy currents to flow in the materials alloy. The induced eddy currents themselves set up a secondary magnetic field which is counter to that established by the probe. As the probe is inserted and wall thickness differences are encountered, the change in counter force creates a voltage impulse. The impulse results in unbalanced voltage across the impedance bridge. By utilizing dual channels and phase discrimination, defects can be presented on the CRT for interpretation.

CALIBRATION PROCEDURE

Prior to testing the material or specimen, all test equipment shall be set up and energized for a period of not less than 15 minutes to allow for stabilization of all electrical circuits.

A set of Calibration standards shall be used to initially balance the test equipment. The calibration standard shall be of the same material and geometry of the item being tested. The calibration standard shall have known defects, "either natural or machined" to provide proper defect orientation and phase angle information. Calibrate the testing apparatus at the start of the test run and at least once every four hours of continuous operation or whenever improper functioning of the apparatus is suspected. If improper functioning is found, re-calibrate the apparatus and retest all items during the period of suspected improper functioning.

CENTRIFUGAL CHILLER TECHNICAL DATA SHEET

DAIKIN McQUAY

CC-1

Job Name:	**Cooley Lab**
Date:	**9/7/2011**
Version:	**07.71**
Submitted By:	**Dan Fry**

Unit Description:

McQuay Model Number:	WMC150DBS13R/E2212-DF-2**/C2012-CNYY-2*****/R134-BAABA
Approval:	ETL Listed / ETL Listed to Canadian Safety Standards (ETL Label / ETLc Label)

Chiller Data:

Unit:	Compressor Type / Quantity - Size:	Centrifugal / 2 - 150
	Capacity (ton):	145.0
	Capacity Control:	VFD / Inlet guide vanes
	Refrigerant:	R134-a
	Refrigerant Charge (lb):	800
	Oil Cooler Type:	None
Evaporator:	Flow (gpm):	373.5
	LWT (°F):	44.0
	Number of Passes:	2
	Fouling Factor (°F.ft².h/Btu):	0.00010
	Tube Material:	Cu
	Tube Wall Thickness (in):	0.028
	Percentage of Propylene Glycol:	35
	Minimum Flow (gpm): (*see note 3*)	275.7
Condenser:	Flow (gpm):	435.0
	EWT (°F):	85.0
	Number of Passes:	2
	Fouling Factor (°F.ft².h/Btu):	0.00025
	Tube Material:	Cu
	Tube Wall Thickness (in):	0.028
	Percentage of Water:	100
Motor/Starter:	Starter Type:	VFD/Integral
	Unit Voltage (V/Hz/Ph):	460/60/3
	Approval Listing:	CA ETL, ETLc
	Data Plate RLA per Unit (A): (*see note 4*)	140
	Data Plate LRA per Compressor (A):	88
	Enclosure Type:	NEMA 1 gasketed
	Starter Location:	Terminal mounted
	Disconnect Type:	Non-Fusible Disconnect
	Control Circuit Transformer:	Without taps
	Power Connection:	Single point
	Maximum Fuse Size (A):	225
	Data Plate MCA (A): (*see note 4*)	158
	Motor Protection:	Standard
	Ground Fault:	None
	Short Circuit Current Rating:	Standard, (power panels only)
	VFD Power Filters:	None
	ASHRAE 90.1 Compliancy:	'04 & '07

Design Performance rated at AHRI Condenser Relief:

								Evaporator		Condenser	
Capacity (ton)	Input (kW)	Performance (kW/ton)	Operating RLA (A)	NPLV (kW/ton)	75% Load (kW/ton)	50% Load (kW/ton)	25 % Load (kW/ton)	PD (ft H_2O)	EWT (°F)	PD (ft H_2O)	LWT (°F)
145.0	99.1	0.684	140	0.392	0.500	0.346	0.307	33.1	54.0	8.4	94.5

Performance Points rated at AHRI Condenser Relief:

Point #	%Load Request	Capacity (ton)	Input Power (kW)	Performance (kW/ton)	Operating RLA (A)	Evaporator				Condenser			
						Flow (gpm)	EWT (°F)	LWT (°F)	PD (ft H_2O)	Flow (gpm)	EWT (°F)	LWT (°F)	PD (ft H_2O)
1	100.0	145.0	99.1	0.684	140	373.5	54.0	44.0	33.1	435.0	85.0	94.5	8.4
2	75.0	108.8	54.3	0.500	84	373.5	51.5	44.0	33.2	435.0	75.0	81.8	8.8
3	50.0	72.5	25.1	0.346	42	373.5	49.0	44.0	33.2	435.0	65.0	69.4	9.2
4	25.0	36.3	11.1	0.307	18	373.5	46.5	44.0	33.3	435.0	65.0	67.2	9.2

Sound Data:

Load	A Weighted Overall	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz
100%	75.5	37.5	49.5	56.0	65.0	72.0	70.0	66.5	64.0
75%	72.5	39.5	48.5	55.0	61.0	69.5	64.5	64.0	60.0
50%	68.5	35.5	48.0	54.5	58.0	66.0	61.0	58.5	53.5
25%	68.0	36.0	48.5	54.5	57.5	65.5	60.5	57.5	52.0

Sound Pressure (dB) measured in accordance with ANSI/AHRI Standard 575-2008 (A-weighted)

Service Points rated at AHRI Condenser Relief:

Point #	Refrig. Charge (lb)	Data Plate LRAD (A)	PD Capacity (lb)	Superheat (degF)	Subcooling (degF)	Evaporator			Condenser		
						Temp (°F)	Pressure (psig)	Velocity (ft/s)	Temp (°F)	Pressure (psig)	Velocity (ft/s)
1	800	88	1,054	1.0	9.6	36.8	32.1	7.9	95.5	114.9	4.5
2	800	88	1,054	1.0	7.2	38.5	33.6	7.9	82.5	91.0	4.5
3	800	88	1,054	1.0	4.8	40.3	35.3	7.9	69.8	70.9	4.5
4	800	88	1,054	1.0	2.3	42.6	37.7	7.9	67.3	67.3	4.5

Certification:

The AHRI 60 hertz Water Cooled Chiller Certification Program covers models that:

- are rated up to 2500 tons (8790 kW cooling) at AHRI Standard Rating Conditions
- have voltages less than or equal to 11000 volts

The AHRI Certification Program specifically excludes:

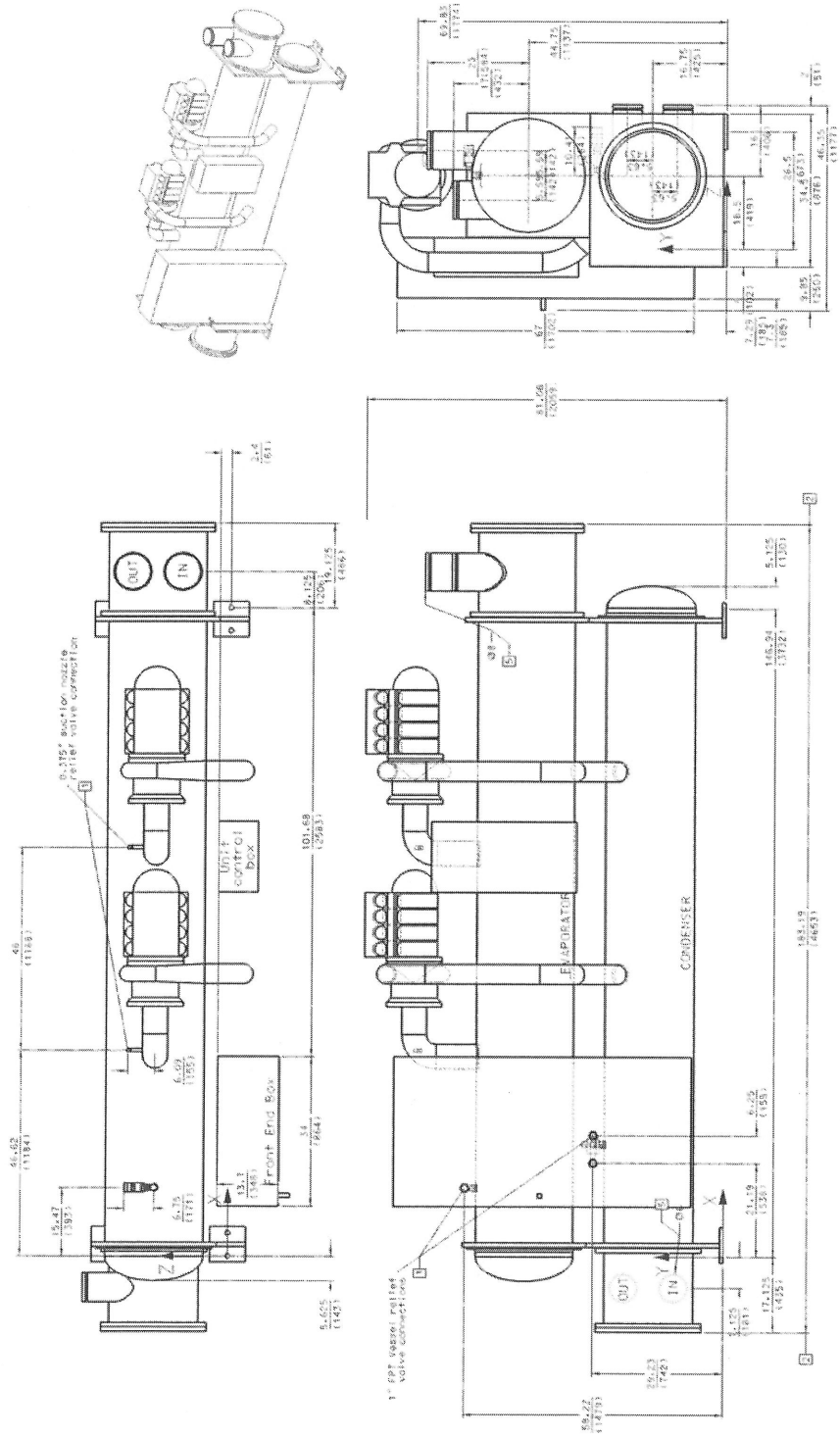
- chillers above 2500 tons (8790 kW cooling)
- chillers with voltages above 11000 volts
- secondary coolant ratings other than water (e.g. glycol ratings)

Notes:

1. Above RLA values are per Unit.
2. Performance kW values are total kW, unless noted otherwise.
3. Minimum flow is based upon standard condenser water relief and not increased lift due to constant condenser water temperature.
4. The field wiring must be sized in accordance with the MCA and not the RLA as some selections may be below the minimum required protection.

Certified Drawing			
Creation Date	09-06-2011(15:54)	Group	CHILLER
Job Name	Cooley Lab	Type	WMC150D
Tag / Item No	CC-1	Effective	June 29, 2011

WMC150D - Evaporator 2212 / Condenser 2012



	Refrigerant lbs (kg)	Total Weight (inc. Refrigerant) lbs (kg)	Water volume gal (l)		Center of Gravity ins (mm)		
			Evap	Cond	X	Y	Z
Operating	800 (363)	9544 (4329)	63 (238)	81 (308)	74 (1879)	34 (865)	15 (388)
Shipping		8340 (3783)	- (-)	- (-)	73 (1865)	34 (867)	15 (383)

1. 1 in. (25 mm) FPT evaporator and condenser relief valves and .375 in. (9mm) suction nozzle relief valves must be piped per ANSI/ASHRAE 15.
2. At a minimum, length of tube sheet to tube sheet dimensions is required at either end for tube removal, 36 in. (914 mm) is required at other end and each side and top for service.
3. Final connections must allow for 0.5 in. (12.7 mm) manufacturing tolerance.
4. 2.5 in. (64 mm) dia. lifting holes are provided. See installation manual for lifting instructions.
5. All water connections are given in standard U.S. pipe sizes. Standard connections are suitable for welding or victualic couplings.
6. Vibration isolator pads are provided for field installation (0.25 in (6 mm) thick when loaded).
7. If main power wiring is brought up through the floor, this wiring must be outside the envelope of the unit.
8. The shipping skid adds 4 in. (105 mm) to the overall unit height.
9. Dimensions shown are for units with standard 150 psi (1034 kPa) design water side pressure. Check factory for unit dimensions with higher pressures.

McQuay Air Conditioning

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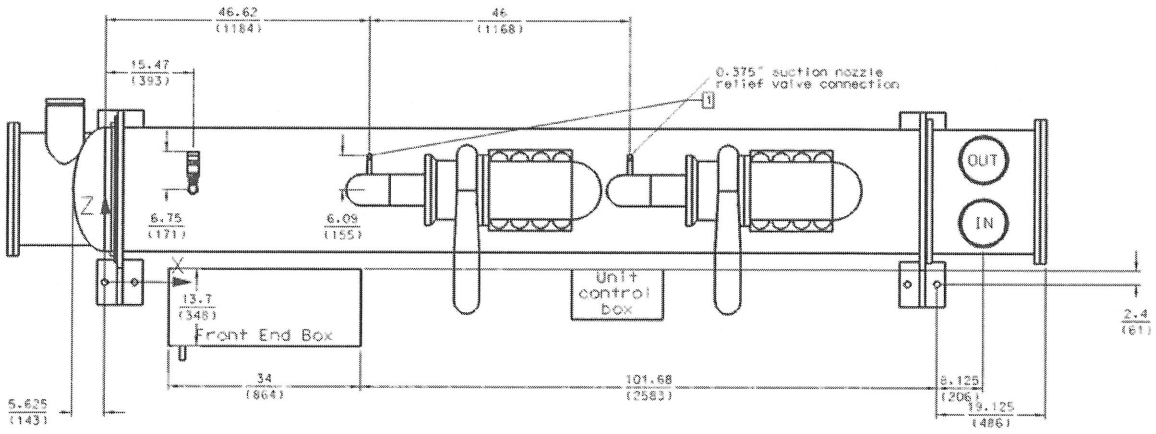
WMC150D - Evaporator 2212 / Condenser 2012



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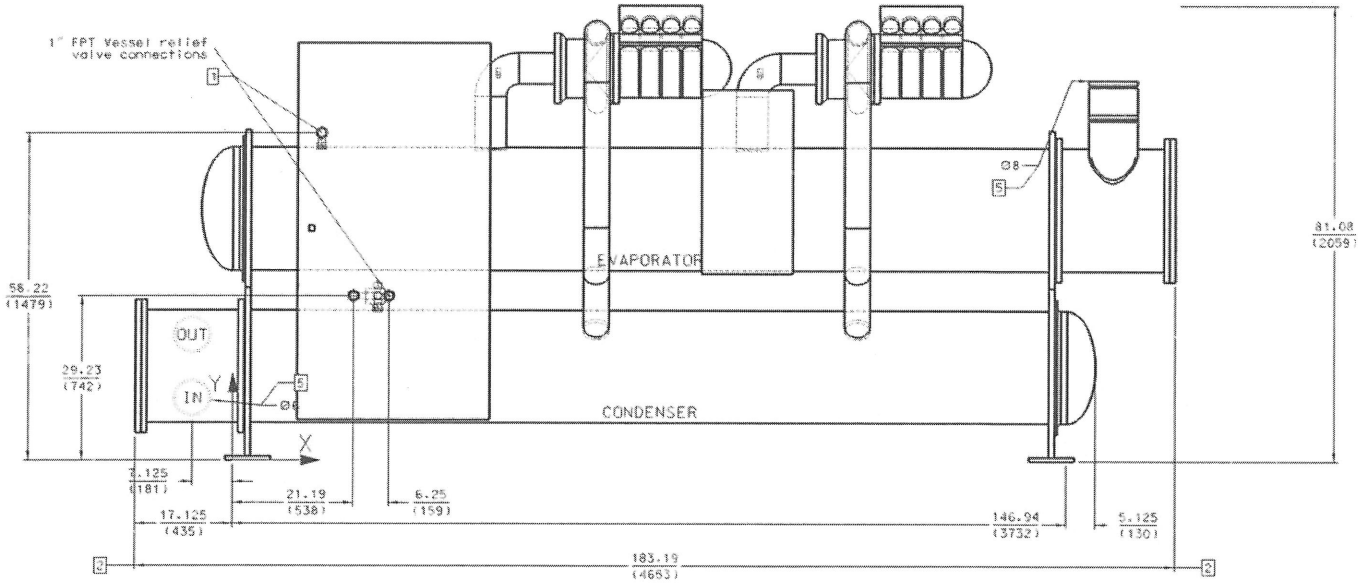

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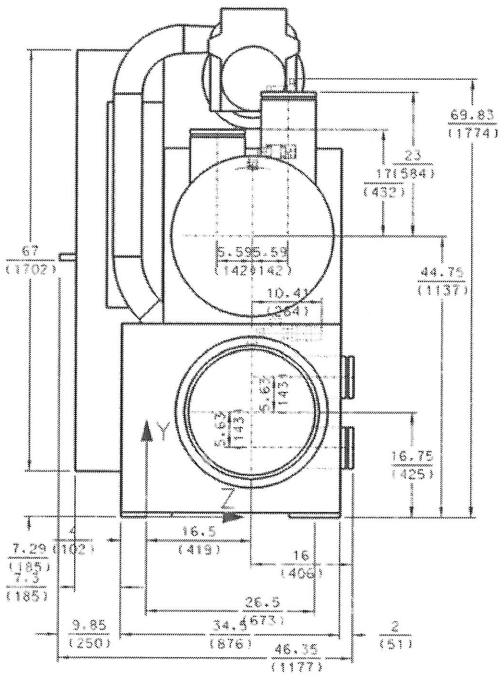

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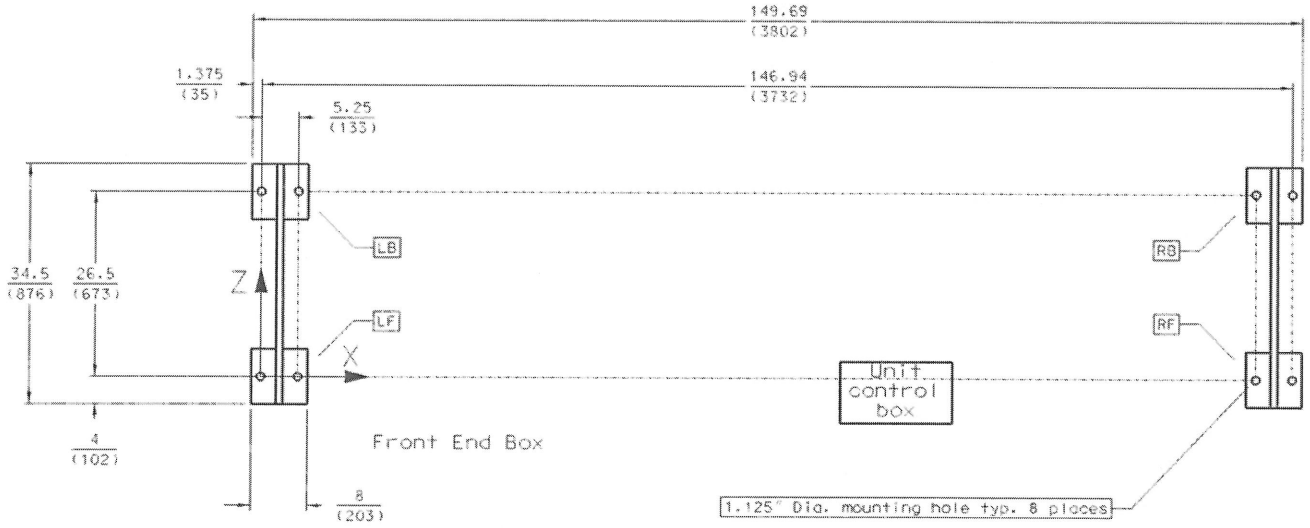

Operating Corner Weight lbs (kg)			
LeftBack (LB)	LeftFront (LF)	RightBack (RB)	RightFront (RF)
2701 (1225)	1990 (902)	2795 (1268)	2059 (934)

McQuay Air Conditioning