REFERENCE INFORMATION

COPPER TUBE

STANDARD* LENGTHS		Type K **HARD** 20' Lengths **COILS** 60' thru 1-1/2 100' thru 1-1/4 40' and 60' - 2" only		Type L / ACR **HARD** 20' Lengths **COILS** 60' thru 1-1/2 100' thru 1-1/4 40' - 2" only		Type M **HARD** 20' Lengths **COILS** Consult		**HARD** 20' Lengths	
NOM	**O.D.**	**WALL**	**WGT/FT**	**WALL**	**WGT/FT**	**WALL**	**WGT/FT**	**WALL**	**WGT/FT**
1/4"	3/8"	0.035	0.145	0.030	0.126	0.025	0.106	—	—
3/8"	1/2"	0.049	0.269	0.035	0.198	0.025	0.145	—	—
1/2"	5/8"	0.049	0.344	0.040	0.285	0.028	0.204	—	—
5/8"	3/4"	0.049	0.418	0.042	0.362	0.030	0.263	—	—
3/4"	7/8"	0.065	0.641	0.045	0.455	0.032	0.328	—	—
1"	1-1/8"	0.065	0.839	0.050	0.655	0.035	0.465	—	—
1-1/4"	1-3/8"	0.065	1.04	0.055	0.884	0.042	0.682	0.040	0.650
1-1/2"	1-5/8"	0.072	1.36	0.060	1.14	0.049	0.940	0.042	0.809
2"	2-1/8"	0.083	2.06	0.070	1.75	0.058	1.46	0.042	1.07
2-1/2"	2-5/8"	0.095	2.93	0.080	2.48	0.065	2.03	—	—
3"	3-1/8"	0.109	4.00	0.090	3.33	0.072	2.68	0.045	1.69
3-1/2"	3-5/8"	0.120	5.12	0.100	4.29	0.083	3.58	—	—
4"	4-1/8"	0.134	6.51	0.110	5.38	0.095	4.66	0.058	2.87
5"	5-1/8"	0.160	9.67	0.125	7.61	0.109	6.66	0.072	4.43
6"	6-1/8"	0.192	13.90	0.140	10.20	0.122	8.92	0.083	6.10
8"	8-1/8	0.271	25.90	0.200	19.30	0.170	16.46	—	—

* FOR SPECIAL LENGTHS OR TEMPERS CONSULT FOR PRICE AND AVAILABILITY.

REFRIGERATION SERVICE TUBE

O.D.	WALL THICKNESS	WEIGHT PER FOOT	WEIGHT PER COIL*	COIL DIAMETER	COILS PER MASTER	WEIGHT PER MASTER
1/8"	0.030	0.0347	1.74	14-3/4"	10	17.4
3/16"	0.030	0.0575	2.88	14-3/4"	10	28.80
1/4"	0.030	0.0804	4.02	14-3/4"	10	40.20
5/16"	0.032	0.109	5.45	14-3/4"	10	54.50
3/8"	0.032	0.134	6.70	16-1/2"	10	67.00
1/2"	0.032	0.182	9.10	20"	5	45.50
5/8"	0.035	0.251	12.55	22"	5	62.75
3/4"	0.035	0.305	15.25	25"	3	45.75
7/8"	0.045	0.455	22.75	27-1/2"	3	22.75
1-1/8"	0.050	0.655	32.75	34-1/2"	—	32.75
1-3/8"	0.055	0.884	44.20	39-1/2"	—	44.20
1-5/8"	0.060	1.14	57.00	42"	—	57.00

* STANDARD 50' COIL – 100' COILS ALSO AVAILABLE AS STANDARD STOCK ITEM.

TEMPERATURE CONTROL TUBE

PACKED 2000' PER BOX

O.D.	WALL	WGT/FT
1/4"	0.025	0.0685

O.D.	WALL	WGT/FT
1/4"	0.032	0.0849

PLASTIC COATED COPPER TUBE

Polyethylene coating made from low density LDPE resin and is extruded at 0.025" minimum wall.

MUELLER INDUSTRIES, INC.

Date_____

Product Certification

Mueller Copper Tube products are all manufactured in the USA. All tubing produced in Fulton, MS, and Wynne, AR, is seamless and of UNS C12200 grade of copper and is manufactured to meet the chemical and mechanical properties of the applicable ASTM specifications set forth below. When specified at order placement, Mueller Copper Tube can supply Certified Tube to meet all requirements of the current applicable ASTM specification, at an additional cost.

Streamline Copper Water Tube (Types K,L,M)
ASTM B88 and ANSI/NSF 61

Streamline Copper Refrigeration Service Coils
ASTM B280

Streamline Nitrogenized ACR Hard Drawn
Copper Tube - ASTM B280

Streamline Copper Drainage Tube (DWV)
ASTM B306

* Please contact Technical Services for certification in Oxygen and Medical service tube. (1.662.862.1700)
Oxygen & Medical Service Tube - To ASTM B819 (Types K & L) Hard Drawn Straight Lengths Only in Accordance To CGA Cleanness Specification; CGA G4.1 (Compressed Gas Association); & NFPA 99 (Health Care Facilities).

NSF 61 Restriction Statement: "Copper Tube (Alloy C12200) is certified by NSF to ANSI/NSF Standard 61 for public water supplies meeting or in the process of meeting the U.S. EPA Lead and Copper Rule (56FR 26460, June 7, 1991). Water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."

P. O. BOX 849 ◆ FULTON, MS 38843 ◆ (662) 862-1700 ◆ FAX (662) 862-3002

P. O. BOX 309 ◆ WYNNE, AR 72396 ◆ (870) 238-3201 ◆ FAX (870) 238-8724

BIOCOLD
ENVIRONMENTS FOR LIFE

EQUIPMENT AND MATERIAL LIST

WEBSTER INTERDISCIPLINARY SCIENCE BUILDING

ROOM #376 | CTR SECTION #130383 | WEBSTER, MO

EQUIPMENT AND MATERIAL COMPONENT LISTING

DESCRIPTION	PRODUCT
Insulated panel structure	Bally Refrigerated Boxes
24x14 view window	Norfab
Control Systems	7” Color Touchscreen
Temperature Controller	Allen Bradley
Lighting	BioCold 48” LED Fixtures
Compressor-Condensing Unit	Keeprite KEZA011H8-HT3B Outdoor Air-Cooled
Evaporator Unit Cooler	Larkin ACM156AE
Copper Tubing	Mueller Streamline Type L ACR
Brazing material	Harris Stay Silv 15
Solenoid valves	Sporlan Rapid Cycle Valves
Piping insulation	Armaflex

BioCold
Environments for Life

February 7, 2016

Paric Construction
Attn: Devin Gates
77 Westport Drive, Suite 250
Maryland Heights, Missouri 63146

RE: Submittal 130383-006 for the Controlled Temperature Room at Webster University Science Building

Dear Mr. Gates:

BioCold Environmental, Inc. is pleased to provide the following documents as our re-submittal package for the walk-in controlled temperature room at the Webster University Interdisciplinary Science Building in Webster, Missouri. This packet responds to each of the items identified in the review comments provided by Cannon Design.

COMMENTS:

1. **Comply with codes per specification 13083.1.3.A.**
   All equipment and installation methods will be in compliance with the relevant codes and regulatory requirements of ASHRAE, the Air Conditioning and Refrigeration Institute (ARI), the American Society for Testing and Materials (ASTM), the National Electrical Manufacturer's Association (NEMA), the National Sanitation Foundation's Standard #7 (NSF), and the Sealed Insulating Glass Manufacturer's Association. OK

2. **Provide Items 2, 3, 4 per Spec 1.4-A.**
   Please see enclosed for drawing more clearly indicating the following: (2) electrical schematic with j-box locations and conduit sizes; (3) refrigerant schematic showing lines and locations of system components, and (4) re-stated design and performance criteria. OK

3. **Provide equipment anchorage information per 1.4.B**
   Please see updated shop drawing showing equipment anchorage detail(s). OK

4. **Provide samples.**
   Samples have been previously provided. We have attempted to obtain custom samples per the specification requirements, but the manufacturer is not able to provide the specified wall/ceiling assembly samples. We have numerous installations in the St. Louis area, and would be pleased to provide either a site visit or photos of other installations. OK

5. **Provide warranty information.**
   Please see warranty letter included in the re-submittal package. OK

A/E: I will submit the sample received by bio-cold which under previous discussion with Kelvin does not meet requirements. Please let me know how to proceed. - Devin

6. **Provide ASTM E84 information per specification 130383.2.2.D.3.**
   Please see updated insulated panel data sheets indicating the ASTM E84 compliance. OK

7. **Coordinate installation and service clearance requirements with all other trades.**
   Clearance requirements will be coordinated during field measurements and throughout the installation process. OK

8. **The electrical drawings show a 20A/2pole (3wire) circuit for the evaporator serving the cold room. This shop drawing indicates a 20A/3pole (4wire) circuit to the control panel.**
   This has been coordinated with the electrical contractor. All control wiring from the control panel to equipment within the room is by BioCold. OK

9. **Coordinate with GC and electrical contractor.**
   We have already had coordination conversations with the GC and electrical contractor and will continue to coordinate throughout the installation process. OK

10. **GC to confirm dimensions work with the floor depression provided.**
    BioCold will also field verify all dimensions prior to fabrication.

11. **Relocate GFCI receptacles to 42” AFF.** Provide GCI receptacles at 42" AFF. Casework countertop is 34" high with 4" backsplash so there will no conflict.
    Please confirm desired receptacle height. The specification indicates that the receptacles should be 42” AFF **unless otherwise noted.** The elevation on A0615/14 clearly scales the receptacles at 48” AFF on center. We are more than willing to relocate the receptacles to 42” AFF on center, but want to confirm that this will not interfere with the casework/counters.

12. **GC to coordinate backing requirements for casework installation with casework manufacturer.**
    By others. GC to coordinate.

13. **GC to coordinate piping routes and condenser location on roof.**
    These routes and locations are being coordinated with the GC. OK

14. **Provide closure trim angles at walls & ceiling. Color to match cold room panels.**
    Closure trim in matching finish will be provided. Trim to be field measured prior to fabrication. OK

15. **Adjust partition wall in front of cold room as needed to accommodate touchscreen controller.**
    Please see revised shop drawing for requested clearances. OK

16. **Inside clear height to 8’-0” AFF.**
    The inside ceiling height will be 8’-10” AFF. With an evaporator that extends 9” from the ceiling, this leaves an inside clear height of 8’-1” AFF. OK

17. **Provide equipment seismic anchorage information per 1.4-B.**
    See item #3 above. OK

18. **Coordinate with GC & provide needed for connections to building automation system, smoke detector and sprinkler per specification 130383.2.6.C.**
    Wall and ceiling panels are adequate to support smoke detector without additional reinforcement required. The exact location for smoke detector can be field coordinated. Sprinkler lines are typically cored by the sprinkler contractor. BioCold does not recommend

GC will coordinate with FP contractor. -Devin Gates

OK

sleeved penetrations, as this creates additional possibility for moisture infiltration. BioCold is willing to make sprinkler penetrations if locations are marked by the sprinkler contractor. This will be coordinated in the field during installation. GC TO COORDINATE CONNECTION TO BUILDING AUTOMATION SYSTEM, IF NEEDED.

19. **Provide information per specification 130383 2.3.A.1 & 2 and 2.3.B.**
The performance information has been updated to include additional information as requested. OK

20. **Provide panel joint securing and sealing information per spec 2.2.D.2.**
See Bally Refrigerated Boxes product data sheets. All panels are constructed with cam lock fasteners and NSF-approved gaskets foamed in place. Flush-mounted caps are provided to close wrench holes. OK

21. **Provide foam-in-place isocyanurate insulation per specification 130383.2.2.D.2.a.**
Polyurethane (PUR) insulation is used by insulated panel manufacturers with cam-lock panel construction due to its high expansion rate (approx. 20:1) and insulation value. Continuous panel line manufacturers often use polyisocyanurate (PIR) insulation which has an expansion rate of approximately 5:1. This makes it acceptable for long panel sheets, but not for foaming around cam locks, conduits, j-boxes, etc. It also has a slightly lower R-value. Polyisocyanurate insulation is not available in cam-lock panel construction. OK

22. **Provide K-factor of 0.118 per specification 130383.2.2.D.2a.**
The K-factor of insulated panel construction varies under different temperature conditions. For cooler applications (mean temperature of 55°F), the insulated panels have an R-value of 28.8 for a 4" thick panel, which equates to a K-value of .139. Under freezer application conditions (mean temperature of 20°F), the K-value drops to .125, reflecting an R-value of 32.1. In either case, 4" thick insulated panels are no longer able to achieve the specified K-values due to changes in the blowing agents used to foam the panels, as mandated by the Montreal Protocol and subsequent environmental regulatory changes. This is consistent across panel manufacturers.

A/E: Confirm this is acceptable -DG

OK

23. **Provide ASTM E84 information per specification 130383.2.2.D.3.**
See item #6 above. OK

24. **Per spec 2.2.E.3 double gasketing on 3 sides of door and wiper gasket on bottom. Self-closing.**
We have been unable to locate a double-gasket for 3 sides of the door, unless we were to apply a surface-mounted gasket in addition to the magnetic gasket built into the door. There is a double sweep gasket at the bottom of the door.

A/E: Confirm this is acceptable -DG

PROVIDE SURFACE-MOUNTED GASKET IN ADDITION TO MAGNETIC GASKET. CALL TO DISCUSS IF THERE ARE ANY DISADVANTAGES.

25. **Provide manual defrost capabilities per spec 2.3.E.3.i.**

OK The controls offer both automatic and manual defrost capabilities.

26. **Provide NFPA 70 and UL508A compliance per spec 2.3.D.5.**
The control panel is in compliance with NFPA 70 and carries a UL508A certification and will be labeled as such. OK

27. **Per spec 2.4.B.7, max sound level in room of 65 dba exclusive of occupancy generated noise.**
Sound characteristics vary based on room configuration, and sound ratings for evaporator fan coils are not available from the manufacturers. We are providing the quietest coil design

available (center-mount) and have never had an issue with sound characteristics of these evaporators. OK

28. **Per spec 2.4.B. Provide automatic hot gas defrost. Provide fully redundant system.**
The room is equipped with both automatic and manual hot gas defrost options. The system is designed such that regular defrost cycles are not required during normal operation. Per pre-bid conversations, redundant refrigeration systems are not required on this project, and were excluded from the scope of our subcontract agreement. OK

Curbs have been coordinated and installed -DG

29. **Provide and coordinate curbs, piping for condenser per spec 2.4.B.4 & 6. Coordinate with GC piping routes, condenser location on roof and power requirements.**
These items are being coordinated with the GC. OK

30. **Provide condensing unit and capacities per architectural specifications and drawings. Install unit and piping per cooler manufacturer requirements and mount on supports shown on architectural drawings.**
The condensing unit and capacities are shown in the product data submittal. Please note that we have upsized the condensing unit slightly from the previous submittal to ensure that we have adequate capacity for pulldown and recovery times. The unit will be installed per manufacturer's requirements and mounted on roof curbs per the project drawings. OK

31. **Cold room cooler: Provide unit and capacities per architectural specifications and drawings. Install unit per manufacturer requirements and as shown on architectural drawings.**
The evaporator coil and its capacity are shown in the product data and its location indicated on our shop drawing. The evaporator coil has also been upsized to match the increased capacity of the condensing unit as noted above. OK

32. **Refrigerant piping shall be installed per cooler manufacturer requirements. Refer to mechanical plans for general diagrammatic routing. Coordinate routing with all other trades.**
Piping shall be installed per manufacturer requirements and routing coordinated with other trades. OK

33. **Refrigerant pipe insulation. Provide jacketing for exterior piping per specification 232500-2.2-D-5. . . .**
The aluminum jacketing requirement was not indicated or referenced in our specification section. We will be pleased to provide pricing for this work, but do not have it included.
Provide the refrigerant insulation jacketing per the specification section given.
Mechanical contractor to provide jacketing if cold room manufacturer doesn't provide. GC TO COORDINATE.

34. **Condensing unit. Provide unit designed and with necessary accessories to operate in conditions between 0 deg. F and 105 deg. F. ambient temperature.**
The condensing unit is designed for operation between -20°F and +110°F. OK

35. **Condensing unit. Provide unit with outdoor enclosure (H) model designation.**
Unit will be provided with outdoor enclosure as indicated on equipment listing and shop drawing. OK

36. **Condensing unit. Provide with accumulator and high pressure safety switch.**
The condensing unit will be provided with both a suction accumulator and high pressure safety switch. OK

37. **Condensing unit: Provide sealed liquid line filter drier and sight glass.**
    The condensing unit will be provided with both a sealed liquid line filter drier and sight glass. OK

A/E: Please confirm this is acceptable

38. **Submittal is missing efficiency information. Provide this data.**
    There is no published efficiency data available at this time. Efficiencies can be calculated from FLA and BTU outputs. All equipment is compliant with federal energy standards.

39. **Submittal is missing warranty information. Provide warranty information.**
    See item #5 above. OK

40. **Electrical information in cold room submittal do not match electrical requirements called for in cold room product data submittal.**
    See item #8 above. OK

41. **Provide self-closing door.**
    Door is self-closing with cam-lift hinges and hydraulic closer device. OK

42. **Heaters to be positioned for easy accessibility for service & replacement.**
    Anti-condensate heaters are positioned under a trim piece at the perimeter of the door that can be removed with a Phillips screwdriver and easily replaced if necessary. OK

Thank you for reviewing these materials. If you have any questions or need additional information, please respond via email to joshua@biocold.com or juffman@biocold.com.

Regards,

Joshua Baker
President

CANNONDESIGN

SUBMITTAL IDENTIFICATION SHEET

To be completed by Contractor/CM

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

Joe Voypick
SUBMITTED BY

130383-006
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

DRAWING / DETAIL REFERENCE

130383
SPECIFICATION SECTION / PARAGRAPH

MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

○ CRITICAL

ITEM BEING SUBMITTED (check only one)

- ○ Shop Drawings
- ○ Samples (_____ copies)
- ○ LEED Submittal
- ○ Certification / Qualifications
- ○ Record Documents
- ◉ Product Data
- ○ Coordination Drawing
- ○ Calculations
- ○ Schedules
- ○ O&M Manuals
- ○ Other _____

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ○ Information Only ○ Record

REMARKS OR DEVIATIONS

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates

Joe Voypick
REVIEWED BY

2/9/17
DATE

To be completed by Reviewer

13 0383-006 REV002
CANNON DESIGN SUBMITTAL NUMBER

2/9/17
RECEIVED DATE

- ○ A. No Exceptions Taken
  No further review of submittal is required.
- ◉ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ○ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ○ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ○ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ○ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS ○ See attached sheet(s) for additional comments

SEE MARKUPS.

SEE ATTACHED MECHANICAL AND ELECTRICAL REVIEW COMMENTS.

Kelvin Patel
Digitally signed by Kelvin Patel
DN: C=US, E=kpatel@cannondesign.com, O=Cannon Design, OU=Architect, CN=Kelvin Patel
Date: 2017.02.24 15:15:09-06'00'
REVIEWED BY

2/24/17
DATE

WM TAO & ASSOCIATES
CONSULTING ENGINEERS

Shop Drawing Submittal Review

Transmitted To: Cannon Design

Date: February 24, 2017

Attention: **stl-cac@cannondesign.com**

Contact Person / WTA Field Inspector: Patrick Garner

Project Name: Webster University-**ISB**

Reviewed by: Jerry Reckmann (Mech)
Mark de la Fuente (Elec)

Project No. WT 14127.01 ☐ UPS ☐ Courier ☒ **Email**

Copies	No.	Description
1 PDF	130383E02A	(Submittal No.'s:) (~~R&B CxSRC~~) - Resubmittal
		(Cannon #130383-**006 REV002**)-(Paric #15051-0490)-(~~WES #607~~)
		➢ **Cold Room Product Data**

*Submittal Review Comments

Electrical Review Comments: The BioCold lamp and ballast information does not appear to be correct. The document indicates three 2-watt lamps and a six-watt ballast. The Topaz lamps included in this submittal indicate they are 22-watts each. Provide a ballast compatible with provided lamps.

Coordinate all electrical installation requirements with electrical contractor and manufacture.

Mechanical Review Comments: Provide the refrigerant insulation jacketing per the specification section given. Mechanical contractor to provide jacketing if cold room manufacturer doesn't provide.

c: **Kelvin Patel**
Kpatel@cannondesign.com

☐ Furnish as Submitted ☒ ***Furnish as Noted**

☐ Rejected ☐ Revise & Resubmit

☐ Reviewed ☐

Corrections or comments made on shop drawings during this review do not relieve contractor from compliance with requirements of drawings and specifications. This check is only for review of general conformance with the design concept of project and general compliance with information given in contract documents. Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

PARIC
EXPERIENCE. EXCELLENCE.
77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0490

Paric Corporation

PROJECT: 15051-Webster University Interdisciplinary Science Building

DATE: 02/09/2017

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

Fax;
314-241-2203

RE: Cold Room Product Data REV1

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☑ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☑ Other: Prodcut Data	☐ Separate Cover Via:	☐ Due Date:

Item	*Package*	*Code*	*Rev.*	*Copies*	*Date*	*Description*	*Status*
Submittal		130383-006	2		02/09/2017	Cold Room Product Data REV1	Submitted

NOTES:

CC:

Signed: _____
Devin Gates