



CTI STD 201 Meeting Minutes

02/11/2015 (1:30 pm-3:00 pm) New Orleans, LA

Chair: Frank Michell

Vice Chair: Jennifer Hamilton

1. The meeting was called to order and a sign-in sheet was distributed. It was established that a quorum was in place.

Voting Member	Attended	Voting Member	Attended
Rich Aull/Bill Miller	x (Bill)	Paul Lindahl	x
Jennifer Hamilton	x	Frank Michell	x
Ken Hennon	x	Tom Weast	x
Zan Liu	x	Barry Woods	x

2. A motion was made by Ken Hennon to approve the July 2014 annual conference Meeting Minutes. It was seconded by Frank Michell and approved unanimously.
3. The editorial changes agreed upon in the July 2014 Meeting were reviewed as shown below. No additional changes were requested. A revised draft of STD 201 RS and STD 201 OM dated February 2015 will be posted on the CTI website with the changes listed below.

- a. Edit for clarification - Section 6.1 RS

Revised Language:

6.1 *Minimum Data Requirements for Published Ratings.* As a minimum, Published Ratings available to the general public shall include **at least (40) forty the listed operating conditions** in either IP or SI units, defined by Tables 3-5 below, for each process fluid or refrigerant included in the certification. Data can be published in IP units, SI units or both per the manufacturer's preference.

- b. Edit for clarification – Section 8.7 OM

Revised Language:

8.7 If the Manufacturer fails to comply with the provision of Paragraph 8.4, 8.5, or 8.6, the CTI Certification Administrator shall promptly:

- (a) Notify the Manufacturer in writing that they have not complied with this Standard and their certification will be withdrawn within twenty (20) working days upon receipt of the written notification, **unless the problem is remedied or an appeal is filed. Advised the Manufacturer of the right to appeal, and that such an appeal must be made to the CTI Board of Directors within twenty (20) working days upon receipt of the written notification and/or received by the CTI Board of Directors within forty (40) working days of the original written notification.**
- (b) The Board shall make provisions to hear and act on any appeal within twenty (20) working days upon receipt of the appeal.
- (b) Notify the President of CTI of the Manufacturer's failure to comply and the pending withdrawal of certification.

c. Edits for clarification – Section 9.1.2 OM

Revised Language:

9.1.2 Before January 31st of each year ~~Within twenty (20) working days after the beginning of each year,~~ the CTI Certification Administrator shall estimate the total general administrative program cost and divide it by the total number of certified lines in the program at that time to establish a program administrative fee rate with consent of the Certification Program Committee (see Para. 5.2(c)) for that year.

d. Combination of STD 201 RS Appendix E and F to reflect DOR format

Appendix E Data of Record

Category	Column Code	Description to help user complete Data of Record
CT/CC/EC GENERIC	A	This section should ONLY be completed by ECC or CTI administrator. Participant completing DOR's MUS not use these columns
	B	
	C	
	D	
	E	
	F	
	G	
	H	
	I	
	J	
	K	
	L	
	M	
Category	Column Code	Description to help user complete Data of Record
General(GEN)	N	Reference sequence value to illustrate the number of models in a product line
	O	Company name
	P	Product line name i.e XYZ
	Q	Revision date of DOR
	R	Cooling Tower Type: Cooling Tower, Closed Circuit Cooler, or Evaporative Condenser
	S	Draft Type: Induced or Forced
	T	Flow type of cooling tower: Counterflow, Crossflow, Combined, or Other
	U	Fan Type with the following alternatives: Axial or Centrifugal
	V	Unit model nomenclature
	W	Nominal Water Flow Rate selected at nominal temperature conditions
	X	Nominal Temperature Conditions (Nominal Temperature Conditions for Open Circuit Cooling Tower, Closed Circuit Cooling Tower, and Evaporative Refrigerant Condensers are specified in STD 201 RS.)
	Y	Number of cells. A cell is the smallest portion of a model that is capable of independent air and water flow operation
	Z	Number of Fans per Cell
AA	Number of Fan Motors per Cell	

Category	Column Code	Description to help user complete Data of Record
General(GEN) Continued	AB	Total Nameplate Fan Motor Power per Model
	AC	Total Rated Fan Motor Power per Model
	AD	Number of Pumps Per Cell
	AE	Total Nameplate Pump Power per Model
	AF	Total Rated Pump Power per Model
	AG	Flow Rate of Recirculating Water
	AH	Static Pressure at Recirculating Water Inlet
	AI	Overall Height of Unit
Axial Fans	AJ	Fan Diameter
	AK	Standard Fan Center Hub or Seal Disk Diameter. Central diameter of blocked airflow
	AL	Fan Stack Height. This is the height of the formed cylinder
	AM	Fan Stack Inlet Area. This area should include any eased inlet integral to the cylinder.
	AN	Fan Stack Throat Area. This area should be the straight section of the cylinder where the fan tracks & is typically the smallest diameter of the cylinder
	AO	Fan Stack Discharge Area. This area should be at the discharge plane of the cylinder and may be equal to or greater than the throat area
	AP	Fan Blade Pitch Adjustment: Fixed or Adjustable
Centrifugal Fans	AQ	Fan Wheel Outside Diameter. This is the outside diameter of the centrifugal fan ring, holding the fan blades in place.
	AR	Fan Wheel Width. This is the outside width of the centrifugal fan.
	AS	Fan Wheel Housing Width Dimension. This is the dimension = A as shown in STD-201 RS Appendix F
	AT	Fan Wheel Housing Outside Dimension. This is the dimension = B as shown in STD-201 RS Appendix F
	AU	Fan Wheel Housing Inside Dimension. This is the dimension = C as shown in STD-201 RS Appendix F
	AV	Fan Wheel Housing Discharge Area.
Eliminators	AW	Eliminator Type: Blade, Cellular or Integral
	AX	Gross Area per Cell
Air Inlet Louvers	AY	Louver Type: Blade, Cellular, or Integral
	AZ	Gross Face Area of Cell. Gross face area at the eliminator plane, used for calculating approach air speed. Not reduced for supports or other blockages in the eliminator plane.
	BA	No.of Air Inlet Faces of the cell
	BB	Air Inlet Height. It should be the dimension of the free opening height when looking face onto the air inlet.
	BC	Louver Spacing. Sheet spacing for cellular louvers or vertical distance center to center between blade style louvers
Wet Heat Transfer Media	BD	Fill Type: Film, Splash Bar, Splash Deck, or Other
	BE	Fill Height
	BF	Number of Counterflow Fill Layers
	BG	Fill Cross Flow Air Travel
	BH	Internal Cell Length
	BI	Internal Cell Width
	BJ	Fill Total Gross Face Area per Cell
	BK	Fill Number of Sheets Over Cell Width
	BL	Fill Number of Sheets Over Cell Length

Category	Column Code	Description to help user complete Data of Record
Wet Heat Transfer Media Continued	BM	Splash Bar Number in Cross Section
	BN	Splash Bar Pattern
	BO	Splash Deck Number of Layers
Heat Exchanger	BP	Type of Heat Exchanger: Coil, Plate HX, or Other
	BQ	Number of Heat Exchangers per Cell
	BR	Number of Total Plates
	BS	Number of Type A plates
	BT	Number of Type B plates
	BU	Number of Type C plates
	BV	Plate Height Dimension
	BW	Plate Width Dimension
	BX	Plate Depth Inside Dimension
	BY	Number of passes
	BZ	Number of rows
	CA	Number of tubes
	CB	Coil Tube diameter
	CC	Heat Exchanger Width
	CD	Heat Exchanger Length
	CE	Heat Exchanger Surface Area
	CF	Heat Exchanger Inlet Nozzle Quantity
	CG	Heat Exchanger Inlet Nozzle Size
	CH	Heat Exchanger Outlet Nozzle Quantity
	CI	Heat Exchanger Outlet Nozzle Size
CJ	Heat Exchanger Gross Face Area	
CK	Heat Exchanger Process Fluid	
CL	Heat exchanger Pressure Drop	
Water Distribution	CM	Water Distribution Type: Spray, Gravity, Trough or Other
	CN	Number of Inlet Connections Per Cell
	CO	Number of nozzles or orifices per cell
	CP	Dimension from underside of nozzle to the top of the wet heat transfer media or Heat Exchanger
Geometric Data	CQ-CU	See STD-201 RS for more information
Attached Files	CV	Name of ZIP data file

The Data of Record is located on the CTI website under the “Cooling Tower Certification” section at <http://www.cti.org/certification.shtml>. Please note example worksheets for the “Minimum Data Requirements for Published Ratings” tables referenced in Section 6 are also included in this file.

CTI Data of Record Submission Instructions:

- All manufacturer's that wish to join the CTI STD-201 program or the ECC Certification program must complete a Data of Record for all products.
- The Data of Record template is provided for both (SI) and (IP) units. Data should begin in cell "N7"
- The Data of Record must be completed and submitted to the CTI thermal certification program administrator in (SI) units, (IP) units or both.
- The Reference Document shall be utilized to ensure the proper data is recorded in the Data of Record

- In addition to the tabular data required, the Data of Record submission must include all of the required data parameters itemized below. All of the data parameters will be combined in a zip file and attached to each model.
1. CTI/ECC unit drawing package must be submitted illustrating overall dimensions, water inlet connection location(s), air inlets (size & location), and air discharge location of product line
 2. CTI/ECC drawing and photograph package for all fan options must be submitted
 - a. Drawing and photograph for each fan diameter (and type if multiple types are possible) will be provided
 - b. Drawing will include tabular data detailing all optional fans available for the given cooling tower model
 - c. Data will include Blade Chord Width (at tip), hub diameter, seal disk diameter (central diameter with blocked air flow), number of blades, blade material, fan speed, fan model designation, and fan stack height(s) available for a given model
 3. CTI/ECC drawing and photograph package for Eliminators must be submitted
 - a. Drawing will include tabular data detailing eliminator materials, model designations, and manufacturer(s)
 4. CTI/ECC drawing and photograph package for Air Inlet Louvers must be submitted
 - a. Drawing will include tabular data detailing louver materials, model designations, and manufacturer(s)
 5. CTI/ECC drawing and photograph package for Wet Heat Transfer Media (Fill) must be submitted
 - a. Drawing will include tabular data detailing fill materials, model designations, and manufacturer(s)
 6. CTI/ECC drawing and photograph package for Heat Exchanger must be submitted
 - a. Drawing will include tabular data detailing materials, model designations, and manufacturer(s)
 7. CTI/ECC drawing and photograph package for Nozzles must be submitted.
 - a. Drawing will include tabular data detailing nozzle materials, model designations, and manufacturer(s)
 8. CTI/ECC Accessory/Footnotes document must be submitted
- e. Update Tables 3-5 in Section 6.1 of 201 RS with data point numbers for ease of use. Concept approved by committee vote September 30, 2013. Additional formatting shown below. Note, it was clarified in the 02/08/15 Thermal Certification Committee meeting that the SI units should match the overall range of the IP units. This was a modification to the July meeting notes that was discussed without objection from the group.

Original Table

Table 3. Cooling Towers (CT) Heat Rejection Capability l/s or gpm								
	Range (F)	9	9	10	10	10	15	15
WB (F)	Approach (F)	7.2	10.8	7	10	12	7	12
55		-	-					
60		-	-					
65		-	-					
69.8		-	*	-	-	-	-	-
70		-	-					
75		-	-					
78		-	-	*	-	-	-	-
80		-	-					
82.4		*	-	-	-	-	-	-
85		-	-					
90		-	-					

* Widely recognized typical international “standard” design condition. Data supplied for these conditions are required at this operating point only.

Revised Table:

Table 3a. Cooling Towers (CT) Heat Rejection Capacity Conditions, IP Units (gpm)									
Range °F	9	9	9	10	10	10	10	15	15
Approach °F	7.2	9	10.8	7	7	10	12	7	10
Wet Bulb Temperature °F	55				#1	#2	#3	#4	#5
	60				#6	#7	#8	#9	#10
	65				#11	#12	#13	#14	#15
	69.8			* #41					
	70				#16	#17	#18	#19	#20
	75				#21	#22	#23	#24	#25
	78				* #42				
	80				#26	#27	#28	#29	#30
	80.6		* #43						
	82.4	* #44							
	85				#31	#32	#33	#34	#35
90				#36	#37	#38	#39	#40	

* Widely recognized international "standard" design conditions to be included in selection table.

Capacity condition reference number for values required in selection table.

Other optional regional standard conditions may be added as points #45, etc.

Table 3b. Cooling Towers (CT) Heat Rejection Capacity Conditions, SI Units (l/s)									
Range °C	5	5	5	5.56	6	6	6	8	8
Approach °C	4	5	6	3.89	4	6	7	4	7
Wet Bulb Temperature °C	12.8				#1	#2	#3	#4	#5
	16				#6	#7	#8	#9	#10
	18				#11	#12	#13	#14	#15
	21			* #41	#16	#17	#18	#19	#20
	24				#21	#22	#23	#24	#25
	25.56				* #42				
	27		* #43		#26	#27	#28	#29	#30
	28	* #44							
	29				#31	#32	#33	#34	#35
	32.2				#36	#37	#38	#39	#40

* Widely recognized international "standard" design conditions to be included in selection table.

Capacity condition reference number for values required in selection table.

Other optional regional standard conditions may be added as points #45, etc.

- f. Add 3 Workbooks to “CTI STD-201 Appendix E, Cooling Tower Data of Record, (excel template)” found on the CTI website to include sample format for Tables 3-5 in Section 6.1 of 201 RS. Concept approved by committee vote September 30, 2013. Additional formatting shown below.

Example Section Excel Template Workbook titled “Section 6 Tables Cooling Towers”:

STD-201RS Table 3a - IP Units - Cooling Towers (CT)

Condition Reference #	1	2	3	4	5	6	7	8	9	10	11	12	13
Wet Bulb °F	55	55	55	55	55	60	60	60	60	60	65	65	65
Range °F	10	10	10	15	15	10	10	10	15	15	10	10	10
Approach °F	7	10	12	7	12	7	10	12	7	12	7	10	12
Inlet Water Temperature °F	72	75	77	77	82	77	80	82	82	87	82	85	87
Outlet Water Temperature °F	62	65	67	62	67	67	70	72	67	72	72	75	77
Model #1 in gpm													
Model #2 in gpm													
Model #3 in gpm													

STD-201RS Table 3b - SI Units - Cooling Towers (CT)

Condition Reference #	1	2	3	4	5	6	7	8	9	10	11	12	13
Wet Bulb °C	12.8	12.8	12.8	12.8	12.8	16	16	16	16	16	18	18	18
Range °C	6	6	6	8	8	6	6	6	8	8	6	6	6
Approach °C	4	6	7	4	7	4	6	7	4	7	4	6	7
Inlet Water Temperature °C	22.8	24.8	25.8	24.8	27.8	26	28	29	28	31	28	30	31
Outlet Water Temperature °C	16.8	18.8	19.8	16.8	19.8	20	22	23	20	23	22	24	25
Model #1 in l/s													
Model #2 in l/s													
Model #3 in l/s													

Note: In the workbook these tables continue to point 44.

There are two additional workbooks titled “Section 6 Tables Coolers” and “Section 6 Tables Condensers”

Clarification Note for each spreadsheet added in 02/08/15 Thermal Certification Meeting:

“Data can be published in either IP units, SI units or both per the manufacturer’s preference within the certified data range of the product. If the product is not certified at a listed design condition or if the flow data point is not applicable to the unit, enter "NC" (for Not Certified) into the cell.”

This clarification note was a modification to the July meeting notes that was discussed without objection from the group.

4. Revisions proposed in the July 2014 meeting were then discussed and voted on as appropriate.
 - a. CTI logo use procedures

Converting Appendix F to a new Logo Use Guide was discussed. A proposed guide was reviewed and discussed. Tom Weast made a motion to approve the below guide. Zan Liu seconded the motion and it was unanimously approved. This will be added to the February 2015 version of STD 201 RS.

Appendix F Logo Use Guide

If a publication such as a catalog, web page or advertisement is 100% devoted to a specific CTI Certified product, the “CTI Certified” logo can be used as shown below without any additional descriptive information.



If a publication such as a catalog or web page or advertisement contains information on several other products, then the “CTI Certified” logo **must also contain the certified product line name and validation number** similar to as shown below so it will be clear which product is certified. The version below can also be used in publications that are 100% devoted to the CTI Certified product if desired.

Line Name and/or Series



Number ####

The CTI logo must never be used to imply that a product line is certified by CTI. As shown below, the CTI logo must have "Member" included per the CTI Brand Guide whenever used including (non CTI) publications, web sites, product labels and other similar publications.



Member

During the discussion it was noted that the Certification Validation No. referenced in Appendix C of 201 OM needed to be revised from XX-XXX to ##### to match the guide above. This clarification will be made to the February 2015 version of STD 201 OM.

- b. **Lowering the minimum wetbulb to 10°C (50°F)** - 3 sections of STD 201 RS will be impacted by this change as described below.

The 3 changes listed below were discussed. There were no objections from the group. Zan Liu made a motion to approve the changes in STD 201 RS. Tom West seconded the motion and the changes were unanimously approved. With Board approval, these changes will be made to the February 2015 version of STD 201 RS as well as the CTI excel data tables in the electronic DOR.

A question of when or if the new data would be required to be submitted by the participating manufacturers was raised by Zan Liu. It was discussed that the manufacturer is allowed to submit only partial data if they do not wish to certify a product line within the entire available range of CTI. At this time no changes will be required to the submitted data tables. It will be discussed further in the Thermal Certification Committee as to when/if this will change.

- 1) Tables 3-5 – Proposed revision requires 5 additional data points for the 55F/10C data points. This would lead to renumbering of the data points.

Range °F	9	9	9	10	10	10	10	15	15
Approach °F	7.2	9	10.8	7	7	10	12	7	10
Wet Bulb Temperature °F	50				#1	#2	#3	#4	#5
	55				#6	#7	#8	#9	#10
	60				#11	#12	#13	#14	#15
	65				#16	#17	#18	#19	#20
	69.8			* #46					
	70				#21	#22	#23	#24	#25
	75				#26	#27	#28	#29	#30
	78				* #47				
	80				#31	#32	#33	#34	#35
	80.6		* #48						
	82.4	* #49							
	85				#36	#37	#38	#39	#40
90				#41	#42	#43	#44	#45	

* Widely recognized international "standard" design conditions to be included in selection table.

Capacity condition reference number for values required in selection table.

Other optional regional standard conditions may be added as points #50, etc.

- 2) Update Appendix B-D lower temperature range to 50F/10C.

<p>B.1.1 The range of certified thermal operating conditions shall not extend beyond:</p> <p>Wet Bulb Temperatures: 10°C to 32.2°C (50°F to 90°F)</p> <p>Maximum Process Fluid Temperature:51.7°C (125°F)</p> <p>Minimum Range 2.2°C (4°F)</p> <p>Minimum Approach: 2.8°C (5°F)</p> <p>Barometric pressure 91.4 kPa to 105 kPa (27" Hg to 31" Hg)</p>
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3) Appendix B-D - Clarify that the barometric pressure note does not pertain to temperature.

B.3.4 Prior to evaluating the unit performance, the capability at test barometric pressure shall be adjusted to standard barometric pressure using Equation B1 below:

$$C_{SBP} = C_{TBP} / (1 + (K_1)(BP_{Std} - BP_T)) \quad [\text{Eqn. B1}]$$

Where:

C_{SBP} = Capability adjusted to Standard Barometric Pressure.

C_{TBP} = Capability at Test Barometric Pressure.

K_1 = Constant equal to 0.0023 for SI and 0.0078 for IP.

BP_{Std} = Standard Barometric pressure equal to 101.325 kPa for SI and 29.92 in Hg for IP.

BP_T = Test Barometric Pressure in kPa (in Hg).

(Note: this equation is valid only for the barometric pressure limits stated above and should not be extrapolated)

c. CTI Magnetic flow meter piping schematic and CTI pitot tube pipe velocity recommendations

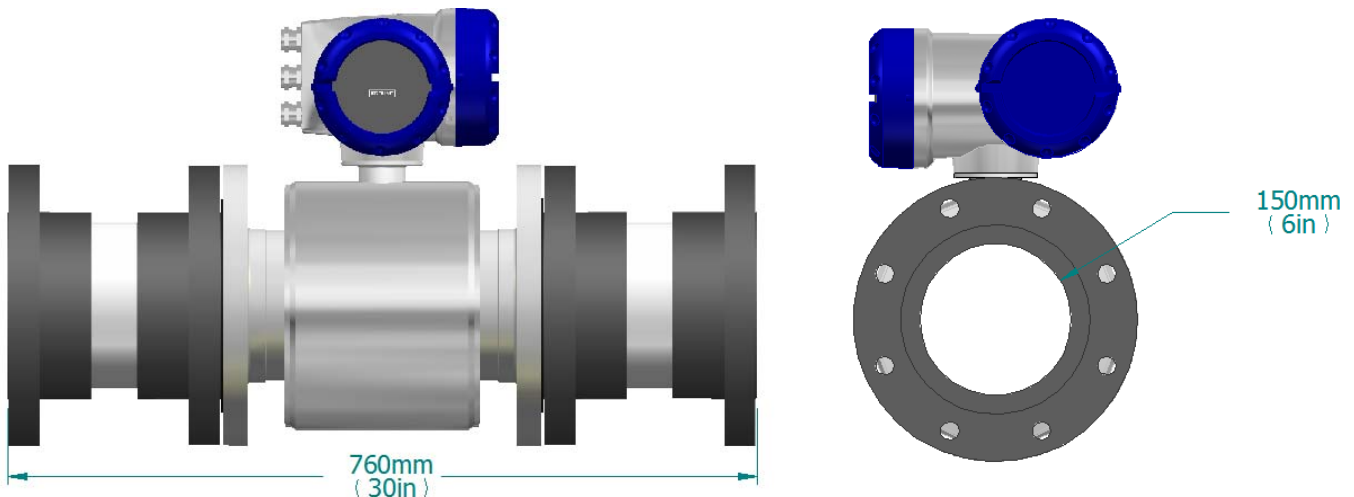
There is currently no information regarding the requirements of the CTI owned devices in STD 201RS. Tom Weast typically supplies documents on pitot tube pipe velocity prior to testing. A copy of his document was reviewed and discussed as a basis for addition to the STD 201RS appendices. Tom has an updated copy that will be sent to Jennifer Hamilton for modification and presentation as an Appendix in the next committee meeting. Tom suggested that a Pitot tube and Prandtl tube drawing be created to complement the magnetic flow meter information.

Scott Nevins created two reference drawings for the CTI magnetic flow meter spool piece. Several comments and suggestions for improvement were made during the meeting including:

- Add ANSI requirements.
- Add power requirement (110 volt, extension cord required per Nick Stich).
- Is dual voltage allowed?
- Create a separate drawing for each mag meter size.
- Add minimum and maximum flow limits as well as minimum upstream and downstream piping limitations to each drawing..
- Include weight and crate size on each drawing

Scott will work on the above items with input from Hussnain Yaser for review at the next meeting.

Discussed Reference Drawings are Shown Below:



d. Edits for clarification – Section 9.1.2 OM

New item added in Feb. 2015 Thermal Certification Committee meeting. There is a request to move the annual budget review up to the July meeting instead of waiting for the February meeting. The concern is that by February many companies will have already scheduled their budgets and any changes to the line fees will not be easy to accept/revise. Barry Woods made a motion to approve this change, Tom Weast seconded, and a unanimous vote of approval was made by the group. This change supercedes the change in Section 3.c. of these meeting notes and will be made to the February 2015 version of STD 201 OM.

Revised Language:

9.1.2 Before June 30th of each year ~~Within twenty (20) working days after the beginning of each year,~~ the CTI Certification Administrator shall estimate the total general administrative program cost and divide it by the total number of certified lines in the program at that time to establish a program administrative fee rate with consent of the Certification Program Committee (see Para. 5.2(c)) for the following ~~that~~ year.

e. Combination Language for advanced testing allowance

STD 201OM Section 4.14 changes: Section 4.14.1 provides language for delayed testing. Mike Womack, Scott Nevins and Manuel Manchacka drafted revised language for this as shown below. Tom Weast made a motion to approve this change, Jennifer Hamilton seconded, and a unanimous vote of approval was made by the group. This change will be in the February 2015 version of STD 201 OM.

Draft Language Proposed:

4.14.1 Annual reverification tests for each line of certified products shall be completed by December 31st of the applicable year. **Reverification tests performed prior to the applicable year shall be allowed, but limited to not exceed one year prior to the applicable year. In this instance, the two models selected from the line of certified products shall be unique.** In the event of extenuating circumstances as deemed by the Certification Administrator, completion of the annual reverification test may be extended to no later than July 31st of the following year.

f. Process fluid pressure drop information – Open Issue

There was much discussion on this open issue including:

- Is adding pressure drop necessary? What is the benefit to the customer?
- If so, how many points should be added?
- Min/Max flow points have been suggested for use – what are the definitions of min/max?

Frank Morrison, Mike Lippy, Zan Liu and Marshal Zable volunteered to come up with a proposal to be presented to the voting members.

g. DOR definition clarifications

During the discussion of pressure drop two definitions in the current DOR were discussed and clarified. These changes will be made to the February 2015 version of STD 201 RS as well as the CTI excel data tables in the electronic DOR.

- Column Code **W** Description was updated to: Nominal Fluid Flow Rate selected at nominal temperature conditions
 - Column Code **CL** Description was updated to: Heat exchanger Pressure Drop at Nominal Fluid Flow Rate Defined in Column **W**
5. Additional new comments or items to be discussed in the next meeting
- a. Mike Womack asked if the barometric pressure equation in STD 201 RS Appendices B-D should be revised to a broader range.
 - b. Billy Childers (after the meeting) asked for clarification on the following items:
 - i. The time period a consumer should be able to consider a CTI certified piece of equipment to perform as published is not included in the current version of STD 201. Why was it removed and should it be added back in some format? Likewise, should we establish a time that a manufacturer is no longer held responsible for the equipment to perform as it was sold?
 - ii. Should language also be added for units in the rental market. This is an area where a company or an individual could purchase a used piece of equipment of an unspecified age and because it was once certified represent the equipment as “CTI Certified”.

6. Adjourn

The meeting was adjourned because the allotted time slot was completed.

After the meeting an Ad Hoc review of the change to lower wet bulb limit was held. There were no comments or concerns from the Ad Hoc reviewers and the issue was presented to the Board on Thursday 2/12/15 with a unanimous vote for approval.

A revised version of the STD 201 RS and OM will be delivered to Vicky Manser by the end of the month for publishing on the CTI website.