BSR/ASHRAE Addendum *d* to
ANSI/ASHRAE Standard 205-2023

Public Review Draft

Proposed Addendum *d* to Standard 205-2023, Representation of Performance Data for HVAC&R and Other Facility Equipment

Second Public Review (April 2025)
(Draft Shows Proposed Independent Substantive Changes to Previous Public Review Draft)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

This standard is under continuous maintenance. To propose a change to the current standard, use the change submittal form available on the ASHRAE website, www.ashrae.org.

The appearance of any technical data or editorial material in this public review document does not constitute endorsement, warranty, or guaranty by ASHARE of any product, service, process, procedure, or design, and ASHRAE expressly disclaims such.

ASHRAE, 180 Technology Parkway NW, Peachtree Corners, GA 30092

Proposed Independent Substantive Change to BSR/ASHRAE Addendum *d* to ANSI/ASHRAE Standard 205-2023, *Representation of Performance Data for HVAC&R and Other Facility Equipment*

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

Foreword to this Addendum d ISC

Standard 205-2023 Addendum d generalizes the RS0001 representation specification to cover liquid-cooled, air-cooled, and evaporatively-cooled chillers. The representation specification title is changed from "Liquid-Cooled Chiller" to "Chiller" to reflect this broader scope. Addendum d as approved by SSPC-205 was open for public review August 30, 2024, through October 14, 2024. No comments were received. However, during preparation of the addendum for publication, the following issues were found:

- *Development of the machine-readable schema corresponding to the human-readable addendum text proved impossible due to technical limitations of JSON schema. Fundamental to Standard 205 is the equivalence of human- and machine-readable representation specifications. The modified human-readable text found below is semantically unchanged relative to the approved addendum and can be mapped to the machine-readable schema.*
- *Oil cooler heat was treated inconsistently in the representation of the different chiller types. Although oil coolers are rare in air-cooled chillers, the data element has been added to all types to simplify software implementation. Representations can provide 0 for oil cooler heat for chillers that do not have oil coolers.*

Although these changes could be characterized as editorial, SSPC-205 has elected to post the updated text for public review.

[Note to Reviewers: Addendum d as modified by this ISC makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and strikethrough (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

ISC to Addendum d to Standard 205-2023

Table RS0001-9 revised as follows:

Table RS0001–9 Performance

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
`condenser_type`	Heat rejection method for the condenser	`<CondenserType>`	-		✓		
`evaporator_liquid_type`	Type of liquid in evaporator	`{LiquidMixture}`			✓		•`LiquidMixture` specifies liquid constituents and their concentrations • Density shall be evaluated at the evaporator inlet liquid temperature
`condenser_liquid_type`	Type of liquid in condenser	`{LiquidMixture}`			if `condenser_cooling_type = LIQUID`		•`LiquidMixture` specifies liquid constituents and their concentrations • Density shall be evaluated at the condenser inlet liquid temperature
`evaporator_fouling_factor`	Factor of heat transfer inhibition due to heat exchanger fouling layer	`Numeric`	$m^2 \cdot K/W$	`≥0.0`	✓		• Evaporator fouling factor at which the performance map was created •May be different from the certification data supplied
`condenser_fouling_factor`	Factor of heat transfer inhibition due to heat exchanger fouling layer	`Numeric`	$m^2 \cdot K/W$	`≥0.0`	if `condenser_cooling_type = LIQUID`		•Condenser fouling factor at which the performance map was created •May be different from the certification data supplied
`compressor_speed_control_type`	Type of compressor speed control	`<SpeedControlType>`			✓		
`cycling_degradation_coefficient`	Cycling degradation coefficient (C_D) as described in AHRI 550/590	`Numeric`	-	`≥0.0, ≤1.0`	✓		Used when the unit cycles to meet a setpoint

	or AHRI 551/591						
scaling	Specifies the range the performance data can be scaled to represent different capacity equipment	{Scaling}					If not present, scaling of the performance data is not allowed
performance_map_cooling	Data group describing cooling performance over a range of conditions	~~{PerformanceMapCooling}~~ ({PerformanceMapCoolingLiquid}, {PerformanceMapCoolingAir}, PerformanceMapCoolingEvaporative})		condenser_type(LIQUID, AIR, EVAPORATIVE)	✓		
performance_map_standby	Data group describing standby performance	{PerformanceMapStandby}			✓		
performance_map_evaporator_liquid_pressure_differential	Data group describing the liquid pressure differential through the evaporator	{PerformanceMapEvaporatorLiquidPressureDifferential)			✓		
performance_map_condenser_liquid_pressure_differential	Data group describing the liquid pressure differential through the condenser	{PerformanceMapCondenserLiquidPressureDifferential)			if condenser_cooling_type = LIQUID		

Table RS0001-10 revised as follows:

Table RS0001–10 PerformanceMapCooling<u>Liquid</u>

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
grid_variables	Data group defining the grid variables for cooling performance	{GridVariablesCooling<u>Liquid</u>}			✓		
lookup_variables	Data group defining the lookup variables for cooling performance	{LookupVariablesCooling<u>Liquid</u>}			✓		

Table RS0001-11 revised as follows:

Table RS0001–11 GridVariablesCooling~~~~Liquid

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
evaporator_liquid_volumetric_flow_rate	Chilled liquid (evaporator) flow	[Numeric][1..]	m^3/s	>0.0	✓	✓	
evaporator_liquid_leaving_temperature	Leaving evaporator liquid temperature	[Numeric][1..]	K	>0.0	✓		
condenser_liquid_volumetric_flow_rate	Condenser liquid flow	[Numeric][1..]	m^3/s	>0.0	✓~~if condenser_cooling_type = LIQUID~~	✓	
condenser_liquid_entering_temperature	Entering condenser liquid temperature	[Numeric][1..]	K	>0.0	✓~~if condenser_cooling_type = LIQUID~~		
~~condenser_air_entering_drybulb_temperature~~	~~Entering condenser air drybulb temperature~~	~~[Numeric][1..]~~	~~K~~	~~>0.0~~	~~if condenser_cooling_type = AIR or condenser_cooling_type = EVAPORATIVE~~		
~~condenser_air_entering_relative_humidity~~	~~Entering condenser air relative humidity~~	~~[Numeric][1..]~~	~~-~~	~~≥0.0, ≤1.0~~	~~if condenser_cooling_type = AIR or condenser_cooling_type = EVAPORATIVE~~		
~~ambient_pressure~~	~~Ambient pressure used to calculate the performance~~	~~[Numeric][1..]~~	~~Pa~~	~~>0.0~~	~~if condenser_cooling_type = AIR or condenser_cooling_type = EVAPORATIVE~~		~~*Informative Note:* the intent of the ambient pressure is to capture the pressure at the installation and not changes in the ambient pressure due to weather effects~~
compressor_sequence_number	Index indicating the relative capacity order of the compressor speed/stage expressed in order from lowest capacity (starting at 1) to highest capacity	[Integer][1..]	-	≥1	✓		• If compressor_speed_control_type is DISCRETE, sequence numbers shall be provided for each discrete stage of the compressor(s) • If compressor_speed_control_type is CONTINUOUS, sufficient sequence numbers shall be provided to capture the continuous operation of the compressor(s)

Table RS0001-12 revised as follows:

Table RS0001–12 LookupVariablesCooling~~~~Liquid

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
input_power	Total power input	[Numeric][1..]	W	≥0.0	✓	✓	All power consumed by the chiller, including controls, motors, variable speed drives, purge units, sump heaters, fans, etc.
net_evaporator_capacity	Refrigeration capacity	[Numeric][1..]	W	≥0.0	✓	✓	The available cooling capacity of the evaporator to the thermal load calculated using only the sensible heat transfer

net_condenser_capacity	Condenser heat rejection	[Numeric][1..]	W	≥0.0	✓	✓	The capacity of the condenser transferred to the condenser cooling stream using only the sensible heat transfer
~~condenser_air_volumetric_flow_rate~~	~~Condenser air flow~~	~~[Numeric][1..]~~	~~m^3/s~~	~~>0.0~~	~~if condenser_cooling_type = AIR or condenser_cooling_type = EVAPORATIVE~~	~~✓~~	
oil_cooler_heat	Heat transferred to another liquid crossing the control volume boundary from the chiller oil cooler.	[Numeric][1..]	W	≥0.0	✓ ~~if condenser_cooling_type = LIQUID~~	✓	Set as 0 if not present or if heat rejection is met by condenser
~~evaporation_rate~~	~~Rate at which water evaporates from the condenser~~	~~[Numeric][1..]~~	~~m^3/s~~	~~≥0.0~~	~~if condenser_cooling_type = EVAPORATIVE~~	~~✓~~	~~Does not include blow down or drift losses.~~
auxiliary_heat	Heat transferred to another liquid crossing the control volume boundary from the chiller auxiliaries (motor, motor controller, inverter drive, starter, etc).	[Numeric][1..]	W	≥0.0	✓	✓	Set as 0 if not present or if heat rejection is met by condenser
operation_state	The operation state at the operating conditions	[<OperationState>]	-		✓		

Tables RS0001-13 to RS0001-18 added as follows:

Table RS0001–13 PerformanceMapCoolingAir

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
grid_variables	Data group defining the grid variables for cooling performance	{GridVariablesCoolingAir}			✓		
lookup_variables	Data group defining the lookup variables for cooling performance	{LookupVariablesCoolingAir}			✓		

Table RS0001–14 GridVariablesCoolingAir

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
evaporator_liquid_volumetric_flow_rate	Chilled liquid (evaporator) flow	[Numeric][1..]	m^3/s	>0.0	✓	✓	
evaporator_liquid_leaving_temperature	Leaving evaporator liquid temperature	[Numeric][1..]	K	>0.0	✓		
condenser_air_entering_drybulb_temperature	Entering condenser air drybulb temperature	[Numeric][1..]	K	>0.0	✓		
condenser_air_entering_relative_humidity	Entering condenser air relative humidity	[Numeric][1..]	-	≥0.0, ≤1.0	✓		
ambient_pressure	Ambient pressure used to calculate the performance	[Numeric][1..]	Pa	>0.0	✓		• ***Informative Note:*** the intent of the ambient pressure is to capture the pressure at the installation and not changes in the ambient pressure due to weather effects

compressor_sequence_number	Index indicating the relative capacity order of the compressor speed/stage expressed in order from lowest capacity (starting at 1) to highest capacity	[Integer][1..]	-	≥1	✓		• If compressor_speed_control_type is DISCRETE, sequence numbers shall be provided for each discrete stage of the compressor(s) • If compressor_speed_control_type is CONTINUOUS, sufficient sequence numbers shall be provided to capture the continuous operation of the compressor(s)

Table RS0001–15 LookupVariablesCoolingAir

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
input_power	Total power input	[Numeric][1..]	W	≥0.0	✓	✓	All power consumed by the chiller, including controls, motors, variable speed drives, purge units, sump heaters, fans, etc.
net_evaporator_capacity	Refrigeration capacity	[Numeric][1..]	W	≥0.0	✓	✓	The available cooling capacity of the evaporator to the thermal load calculated using only the sensible heat transfer
net_condenser_capacity	Condenser heat rejection	[Numeric][1..]	W	≥0.0	✓	✓	The capacity of the condenser transferred to the condenser cooling stream using only the sensible heat transfer
condenser_air_volumetric_flow_rate	The volumetric flow rate of the air through the condenser	[Numeric][1..]	m^3/s	>0.0	✓	✓	
oil_cooler_heat	Heat transferred to another liquid crossing the control volume boundary from the chiller oil cooler.	[Numeric][1..]	W	≥0.0	✓	✓	Set as 0 if not present or if heat rejection is met by condenser
auxiliary_heat	Heat transferred to another liquid crossing the control volume boundary from the chiller auxiliaries (motor, motor controller, inverter drive, starter, etc).	[Numeric][1..]	W	≥0.0	✓	✓	Set as 0 if not present or if heat rejection is met by condenser
operation_state	The operation state at the operating conditions	[<OperationState>]	-		✓		

Table RS0001–16 PerformanceMapCoolingEvaporative

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
grid_variables	Data group defining the grid variables for cooling performance	{GridVariablesCoolingEvaporative}			✓		
lookup_variables	Data group defining the lookup variables for cooling performance	{LookupVariablesCoolingEvaporative}			✓		

Table RS0001–17 GridVariablesCoolingEvaporative

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
evaporator_liquid_volumetric_flow_rate	Chilled liquid (evaporator) flow	[Numeric][1..]	m^3/s	>0.0	✓	✓	

evaporator_liquid_leaving_temperature	Leaving evaporator liquid temperature	[Numeric][1..]	K	>0.0	✓		
condenser_air_entering_drybulb_temperature	Entering condenser air drybulb temperature	[Numeric][1..]	K	>0.0	✓		
condenser_air_entering_relative_humidity	Entering condenser air relative humidity	[Numeric][1..]	-	≥0.0, ≤1.0	✓		
ambient_pressure	Ambient pressure used to calculate the performance	[Numeric][1..]	Pa	>0.0	✓		• ***Informative Note:*** the intent of the ambient pressure is to capture the pressure at the installation and not changes in the ambient pressure due to weather effects
compressor_sequence_number	Index indicating the relative capacity order of the compressor speed/stage expressed in order from lowest capacity (starting at 1) to highest capacity	[Integer][1..]	-	≥1	✓		• If compressor_speed_control_type is DISCRETE, sequence numbers shall be provided for each discrete stage of the compressor(s) • If compressor_speed_control_type is CONTINUOUS, sufficient sequence numbers shall be provided to capture the continuous operation of the compressor(s)

Table RS0001–18 LookupVariablesCoolingEvaporative

Name	Description	Data Type	Units	Constraints	Req	Scalable	Notes
input_power	Total power input	[Numeric][1..]	W	≥0.0	✓	✓	All power consumed by the chiller, including controls, motors, variable speed drives, purge units, sump heaters, fans, etc.
net_evaporator_capacity	Refrigeration capacity	[Numeric][1..]	W	≥0.0	✓	✓	The available cooling capacity of the evaporator to the thermal load calculated using only the sensible heat transfer
net_condenser_capacity	Condenser heat rejection	[Numeric][1..]	W	≥0.0	✓	✓	The capacity of the condenser transferred to the condenser cooling stream using only the sensible heat transfer
condenser_air_volumetric_flow_rate	The volumetric flow rate of the air through the condenser	[Numeric][1..]	m^3/s	>0.0	✓	✓	
evaporation_rate	The rate at which water evaporates from the condenser	[Numeric][1..]	m^3/s	≥0.0	✓	✓	This does not include blow down or drift losses.
oil_cooler_heat	Heat transferred to another liquid crossing the control volume boundary from the chiller oil cooler.	[Numeric][1..]	W	≥0.0	✓	✓	Set as 0 if not present or if heat rejection is met by condenser
auxiliary_heat	Heat transferred to another liquid crossing the control volume boundary from the chiller auxiliaries (motor, motor controller, inverter drive, starter, etc).	[Numeric][1..]	W	≥0.0	✓	✓	Set as 0 if not present or if heat rejection is met by condenser
operation_state	The operation state at the operating conditions	[<OperationState>]	-		✓		