BSR/ASHRAE Addendum *g*
to ANSI/ASHRAE Standard 90.4-2019

Public Review Draft

Proposed Addendum *g* to Standard 90.4-2019, *Energy Standard for Data Centers*

First Public Review (July, 2022)
(Draft Shows Proposed Changes to Current Standard)

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

(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

Definitions were added and language in Section 6 to support the regulation of process heat and process ventilation.

Specific details about any heated standby generators, or ventilation or humidity control equipment systems now will be necessary to include in the MLC.

The baseline process cooling MLC values provided in Table 6.5 were based on simulation data for a mechanical system designed to condition only the ITE equipment. The energy simulations did not include cooling for UPS and other electrical losses.

To accommodate these increases in annual energy for data center HVAC, the project maximum MLC mechanical compliance target values in Table 6.5 were made less stringent (bigger).

The new calculated annual ventilation and heat totals have been shown as segment values in Table 6.5. These new mechanical segment values are intended to be used as the electrical segments are intended to be used; allowing trade-offs that meet the same overall MLC, or as a sub-target allowance for when the scope is limited to a single segment or two (wherever Section 11 did not apply to the previous data center design compliance). This way, the addition of a single piece of cooling equipment will no longer trigger the need to re-calculate ELC and MLC for the entire data center including the new cooling equipment.

Changes were made in anticipation of water-cooled ITE such that we will now regulate data center cooling systems, not just systems that cool the data center area.

The definition for area (used in watts per square foot determination) was changed to match the Standard 90.1 definition.

[Note to Reviewers: This addendum makes proposed changes to the standard. These changes are indicated in the text by <u>underlining</u> (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 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.]

Addendum g to Standard 90.4-2019

Modify Section 3 as follows

3. DEFINITIONS

air, exhaust: air removed from a *space* and discharged to outside the building by means of mechanical or natural *ventilation systems*. design.

air, supply: air to be delivered by mechanical or natural *ventilation* design to a *space*, composed of any combination of *outdoor air*, *recirculated air*, or transfer air air designed to move from another *space*

annualized mechanical load component (annualized MLC): the sum of all cooling, fan, pump, and heat-rejection annual *energy* use divided by the *data center ITE energy* The *annualized MLC* value is precisely defined by equation 6.5. A *design professional* calculates a particular *data center system's annualized MLC* by modeling the routine intended electrical and mechanical *efficiency* for each hour, or *bin*, of a standard local year's weather, across several *ITE* part-load power levels. The resulting calculated value, once reviewed, becomes the *annualized MLC* compliance value for that particular electrical and mechanical *design* for that data center's initial construction or subsequent modification.

bins: in the context of the *annualized MLC*, refers to the practice of organizing 8760 hourly data points into closely-similar groupings (or *bins*) in order to simplify annual calculations. Some *bins* will contain more annual hours than other *bins*, and so are proportionally factored into the model's annual results. For 90.4 *bin* requirements see Section 6.5.1.

cabinet: a container that encloses connection devices, terminations, apparatus, wiring, and *equipment* mounting rails.

conditioned floor area: see *conditioned floor area, gross* in ANSI/ASHRAE/IES Standard 90.1. The floor area of room(s), designed for a *data center*'s *ITE*, including the footprint of any distributed HVAC *and UPS equipment* and all floorspace required by component manufacturers and for equipment replacement in place. (see "white space" in Figure C-1 of INFORMATIVE APPENDIX C).

cooled space: see *space, conditioned space*.

cooling energy: the sum of all routine annual site *energy* in *kilowatt*-hours required to provide cooling via vapor compression, *ventilation*, dehumidification, humidification, evaporation, absorption, adsorption, or other means including the seasonal direct or indirect use of cooler outdoor air. *Cooling energy* includes *energy* input to pumps and fans however long they provide cooling, also any energy input necessary to remove this fan heat. *Cooling energy* does not include input energy for fans intrinsic to the *ITE* nor to *UPS equipment*. The branch circuit energy, or controller input energy for fans that are not intrinsic to the *ITE* (for example installed nearby to remove heat using baffles, cooling coils, or *cabinet*-wide fan arrays) are included in *cooling energy* even if their electrical power is to be routed through the *UPS*. Calculations shall be corrected so input *cooling energy* represents the effect of any freeze-protection added by design to circulating fluids in the *data center cooling systems*. In the case of cooling provided by a source other than electricity, the *energy* consumption shall be converted to input kilowatt-hours (input kWh = output kWh / overall cooling *efficiency* at that hour).

data center energy: annual *energy* use of the *data center*, including all *ITE energy* plus input *energy* that supports the to *ITE* and *data center* *space* systems energy.

fan brake power: the power delivered to the fan's shaft. Brake power (bp) does not include the mechanical drive *losses* (e.g., belts, gears).

heating energy: the routine annual input energy in *kilowatt*-hours to *data center systems* intentionally designed to raise the temperature of a liquid or the temperature or humidity of an air stream. *Heating energy* does not include any *ITE equipment* heat output, nor input energy to fans in heat rejection equipment outside the building envelope. Input energy to *ITE* process heating and process ventilation fans (while providing heat to *data center systems*) are included in *heating energy.* Estimated annual *energy* for freeze protection of cooling tower basins, tanks and pipes are to be included in the data center's *heating energy*. Use of recovered energy shall not increase *heating energy* totals in the MLC calculation. In the case of heating provided by a source other than electricity, the energy consumption shall be converted to input kilowatt-hours (input kWh = output kWh / heater overall efficiency at that hour).

ITE enclosure: a rack, *cabinet*, or chassis that is designed to mount and enable ~~appropriate *ventilation*~~ cooling of *ITE*.

***process cooling segment**:* the *process cooling segment* of the *annualized MLC* shall include all routine annual *cooling energy* required to remove and reject the losses in the *design ELC*; that is, the losses in the conditioned electrical segments in that particular *data center* electrical design. If the *process cooling* and *process ventilation* share the same fan, that fan energy may be adequately accounted for in in *the process cooling segment*. Energy input to seasonal relief fans is included in the *process cooling segment*. If the *incoming electrical service segment* is cooled by fan, that *cooling energy* is included in the *process cooling segment*. If the cooling system is shared (designed to also routinely I see Section 11.3 for instructions to calculate *annualized MLC*.

process heating segment: the *process heating segment* of the *annualized MLC* shall include all routine annual *heating energy* required to maintain the design temperature of standby power systems and their rooms or enclosures. The *process heating segment* includes input to any generator engine block or generator coolant heaters that are part of the design, as well as estimates of annual heat consumed by tank heaters, tower basin heaters, and any other *data center* site freeze protection. *Data center systems*' recovered heat is considered to be free (of any requirement to include its *input energy* kWh in the *annualized MLC* compliance calculations), so the *process heating segment* value does not increase when any recovered heat is designed to be used for process heating or any other purpose (such as outdoor ice melting). The *process heating segment* does not include any *heating energy* accounted for in the *process ventilation segment*. If the heating *system* is shared (designed to also routinely heat non-*data center* spaces) see Section 11.3 for instructions to calculate *annualized MLC*.

process ventilation segment: the *process ventilation system* of the *annualized MLC* shall include all routine annual *heating energy* and *cooling energy* of the *data center systems* designed to humidify or dehumidify the data center and to introduce outside air for continuous *ventilation* or pressurization and to power any continuous exhaust. If the *process cooling* and *process ventilation segments* share the same fan, that fan energy may be included in the *process cooling segment*, only. *Data center systems*' recovered heat is considered to be free (of any requirement to include its *input energy* kWh in the *annualized* MLC compliance calculations), so the *process ventilation segment* does not increase due to any recovered heat used to reduce *heating energy* in the *process ventilation segment*. If the *ventilation* system is shared (designed to also routinely ventilate non-data center spaces) see Section 11.3 for instructions to calculate *annualized MLC.*

> ***Informative Note:*** The *process ventilation segment* compliance value is based only on a minimum *ambient air* flow, so both the *process cooling* and the *process ventilation segments* can reduce their calculated values with economizer designs that increase *ambient air* exchange for process cooling or reduce *ventilation* temperature during appropriately cooler weather.

motor ~~fan~~ brake power: the power delivered ~~to the fan's shaft~~ from the motor's output. *Motor* ~~Brake~~*brake* ~~power~~*power* ~~(bp) does not~~ includes the mechanical drive *losses* (e.g., belts, gears) in the conditioned *space*, so it best represents system *energy* consumed.

rack: A method of *ITE equipment* installation and cable organization that consists of a set of open vertical mounting rails.

terminal: a device by which *energy* from a *system* is finally delivered (e.g., registers, diffusers, lighting fixtures, isolation valves ~~faucets~~), terminating prior to the interface with the *ITE* *enclosure*. For devices used for other purposes or in other *systems*, the definition of *terminal* in ANSI/ASHRAE/IES Standard 90.1 applies.

Modify Section 4 as follows

4.1.1.5 Changes in *Space* Conditioning. ~~Whenever unconditioned space or semiheated space that is a data center space is converted to a conditioned space, such conditioned space shall be brought into compliance with all requirements of this standard that apply to the data center space's building envelope, heating, ventilating, air conditioning, service water heating, power, lighting, and other systems and equipment of the space as if the data center space was new~~ Whenever *unconditioned space* or semiheated *space* that is a *data center space* is converted to a *data center* and *space* for its *systems*, such *space* shall be brought into compliance with all requirements of this standard that apply to the *data center space's building envelope*, heating, ventilating, air conditioning, *service water heating*, power, lighting, and other *systems* and *equipment* of the *space* as if the *data center space* was new. Changes of *space* conditioning in other *spaces* shall comply with ANSI/ASHRAE/IES Standard 90.1, Section 4.1.1.5.

Modify Section 6, revise Equation 6.5, and Table 6.5 as follows

6.1.1 Scope. Section 6 specifies the *efficiency* requirements for *heating, ventilating, and air-conditioning* (*HVAC) systems* installed to serve *data centers* ~~*spaces*~~. *HVAC systems* installed to serve other *spaces* shall comply with ANSI/ASHRAE/IES Standard 90.1, Section 6~~.~~ or as adopted by the authorities having jurisdiction.

6.1.1.1 New *Buildings*. Mechanical *equipment* and *systems* installed to serve the heating, cooling, and ventilating needs of *data centers* ~~*spaces*~~ in new *buildings* shall comply with the requirements of ~~this section as described in Section 6.2 or Section 11~~ Section 4.2.1.1.

6.1.1.2 *Additions* to *Existing Buildings*. Mechanical *equipment* and *systems* installed to serve the heating, cooling, or *ventilating* needs of *data centers* ~~*spaces*~~ in *additions* shall comply with the requirements of ~~this~~ section 4.2.1.2 ~~as described in Section 6.2 or Section 11~~.

Exception to 6.1.1.2: ~~Where HVAC air is provided to a *data center space* in an *addition* by using the existing *HVAC systems* and *equipment*, such *existing systems* and *equipment* shall not be required to comply with this standard. However, any new *systems* or *equipment* installed must comply with specific requirements applicable to those *systems* and *equipment*~~,

Where existing *HVAC systems* and *equipment* are extended to a *data center addition*, such *existing systems* and *equipment* shall not be required to comply with this standard. However, any new *systems* or *equipment* installed must comply with specific requirements applicable to those *systems* and *equipment*, see Section 4.2.1.2

~~**6.1.1.3.2** New heating, ventilating and cooling *systems* installed to serve previously uncooled *spaces* shall comply with this section as described in Section 6.2.~~

6.2.1 Compliance. The *HVAC system* shall comply with Section 6.1, "General"; Section 6.4, "Mandatory Provisions," Section 6.5, "Maximum *Annualized Mechanical Load Component (Annualized MLC)*," and Section 6.6, "Submittals."

6.5 Maximum *Annualized Mechanical Load Component* (*Annualized MLC*). *Annualized MLC* shall be calculated using Equation 6.5. The resulting value shall be less than or equal to the value in Table 6.5, "Maximum *Annualized Mechanical Load Component (*Maximum *Annualized MLC)*."

Equation 6.5

$$\text{Annualized MLC} = \frac{\sum N = 25, 50, 75, 100(\text{MechE}_N - \text{HeatRec}_N)}{\sum N = 25, 50, 75, 100\text{DataCenterITE}_N} \qquad (6.5)$$

$$\text{Annualized MLC} = \frac{\text{MechE for 25\% ITE design} + \text{MechE for 50\% ITE design} + \text{MechE for 75\% ITE design} + \text{MechE for 100\% ITE design}}{2.5 \times 8760 \text{ hours} \times \text{ITE design power}}$$

where

MechE = ~~MechE_N(kWh)=~~	(*process cooling segment* + *process ventilation segment* + *process heating segment*); all in kWh, determined annually and according to the design, at that % of *ITE design.* To show effect of heat recovery on these systems, see 6.5.2(d). To show the effect of on-site renewables on MLC, see 11.2. ~~Total annual *energy* consumed by all mechanical *equipment* (e.g., fans, pumps, motors, drives, compressors, humidifiers, dehumidifiers, water filtration or treatment equipment) at a constant *ITE* load of *N%* of the design *ITE* load. This includes mechanical equipment serving data center electrical *equipment* (e.g., *UPS systems* and *transformers*). *Energy* use of shared *systems* that serve both *data center spaces* and non-*data center spaces* must be pro-rated on an hourly capacity-weighted basis, (***Informative Note***: For example, if 62% of the load on a chiller plant in a given hour comes from *data center spaces*, with the remaining 38% from non-*data center spaces*, then only 62% of the total chiller plant *energy* for that hour can be included in the MechE.)~~ ~~Mechanical *equipment energy* for *equipment* dedicated to *data center spaces* shall be calculated with Typical Meteorological Year Version 3 (TMY3) data with 8760 hourly bins or that is binned by dry bulb and wet bulb (or dew point) with a resolution ≤2°F (1°C).~~
~~HeatRec_N(kWh)=~~	~~Net increase in *data center* mechanical *equipment energy* caused by transferring waste heat from the *data center* when the *data center* is operating at a constant *ITE load* of *N%* of the design *ITE* load, to a non-*data center* mechanical *system* (e.g. *space* heating or industrial process *energy*). The net offset is quantified by simulating the *data center* with and without *data center* heat transfer.~~ ~~Informative note: the purpose of the HeatRec term is to ensure that, by encouraging the transfer of otherwise wasted heat to a useful purpose, the design is not penalized in the MLC calculation by any net energy~~

	~~increases incurred by adding heat transfer equipment [e.g. transfer fans] or operating data center cooling equipment at lower efficiency in order to facilitate heat recovery [e.g. operating a heat recovery chiller at high lift]).~~ ~~Annual energy for shared systems and for heat recovery shall be calculated using an 8760 hour TMY3 file and accurate heating/cooling load profiles.~~
~~DataCenterITE$_N$(kWh)=~~	~~Total annual *energy* consumed by the *ITE* at a constant *ITE* load of *N%* of the design *ITE* load. For example, DataCenterITE$_{50}$ for a design *ITE* load of 1000 kW = 1000 kW x 8760 h x 0.5 = 4,380,000 kWh. ITE energy does not include UPS losses but does include server fan energy.~~

~~Calculations/simulations shall be made using the control sequences and set points in the compliance documentation. (***Informative Note:*** As an example, If a *data center* includes redundant air handlers, but all air handles will operate in unison at reduced speed during normal operation, then calculations will reflect *equipment* part-load performance at those simulated conditions as noted on the design documents.)~~

~~Mechanical *equipment energy* not provided by electricity shall be converted to kWh using using the following formula:~~

~~3,412 Btu = 1.0 kWh~~

~~**Exception:** *Energy* from Shared *Systems* shall be calculated in accordance with Section 11.3.~~

Informative Notes:

1. All values are in kWh of annual energy. See section 6.5.1 for MLC calculation requirements.
2. The calculated *annualized MLC* does not directly compare to a *data center's* annual measured design power usage effectiveness (PUE); the calculated *annualized MLC* is calculated using archived weather (not measured during actual weather) and does not take any electrical distribution *losses* into account.
3. Examples of annualized MLC calculations reviewed by the committee members have been provided at https://www.ashrae.org/technical-resources/bookstore/supplemental-files/supplemental-files-for-ansi-ashrae-standard-90-4-2019.
4. The process cooling segment values were based on 20°F (11°C) Δ*T* for air pulled through *ITE*, and a design *return air* temperature of 85°F (29°C). These maximum annualized MLC values were developed using *equipment* currently available from multiple *manufacturers*
5. The *process heating segment* values for data center ITE power > 300 kW are based on an indoor heated *space* with insulation meeting ASHRAE 90.1. The *process heating segment* values for data center ITE power = 300 kW were based on individual manufacturer's outdoor enclosures. Those enclosures and spaces typically stay heated 24x7, for ready serviceability. Generator coolant heaters were based on thermostat control of resistance heat, set to 120° with a coolant pump operating, and generator heat contributing to room or enclosure heating. All

of the design's generators were assumed to be installed and heated at each (25%, 50%, 75%, 100%) of the calculated ITE levels.

6. The *process ventilation* segment values were based on a system that introduces or pressurizes the data center with 3.8 cfm of outside air per kW of part-load ITE power, full time. Preheat and direct humidification were assumed along with DX dehumidification to keep the data center dew point within Thermal Guidelines for Data Processing Environments, 4th Edition, recommended thermal envelope. For data centers with ITE power >300 kW, that *ventilation* preheat was assumed to be mostly avoided or recovered

6.5.1 Annualized MLC for Partial Renovations. For a facility being renovated where only one or two of the *annualized MLC* segments is being modified, compliance requirements in Table 6.5 apply only to the segments being modified. Trade-offs are allowed among *process cooling*, *process heating,* and *process ventilation segment* values to meet the aggregate requirement of only those *annualized MLC* segments involved in the project's scope.

Table 6.5 Maximum Annualized Mechanical Load Component (Annualized MLC)

Table 6.5 Maximum *Annualized Mechanical Load Component* (*Annualized MLC*)

Climate Zones as Listed in ASHRAE Standard 169	HVAC Maximum *Annualized MLC* for *Data Center ITE Design Power* > 300 *kW*	HVAC Maximum *Annualized MLC* for *Data Center ITE Design Power* ≤ 300 *kW*
0A	0.25	0.31
0B	0.28	0.34
1A	0.26	0.31
1B	0.27	0.32
2A	0.23	0.29
3A	0.21	0.27
4A	0.18	0.26
5A	0.16	0.25
6A	0.16	0.24
2B	0.17	0.27
3B	0.17	0.26
4B	0.14	0.24
5B	0.14	0.23
6B	0.14	0.24
3C	0.14	0.23
4C	0.14	0.23
5C	0.14	0.23
7	0.14	0.23
8	0.13	0.22

Climate zones as listed in ASHRAE Std. 169	Design *ITE* power > 300 kW				Design *ITE* power <= 300 kW			
	Process heating segment	*Process ventilation segment*	*Process cooling segment*	Maximum *annualized MLC*	*Process heating segment*	*Process ventilation segment*	*Process cooling segment*	Maximum *annualized MLC*
0A	0	0.01	0.28	0.29	0.01	0.01	0.35	0.37
0B	0	0.01	0.31	0.32	0.01	0.01	0.39	0.41
1A	0	0.01	0.29	0.30	0.01	0.01	0.35	0.37
1B	0	0.01	0.30	0.31	0.01	0.01	0.37	0.39
2A	0.01	0.01	0.26	0.27	0.01	0.01	0.33	0.35
3A	0.01	0	0.23	0.24	0.01	0.01	0.31	0.33

4A	0.01	0	0.20	0.21	0.02	0.01	0.30	0.33
5A	0.01	0	0.18	0.19	0.02	0.02	0.29	0.34
6A	0.01	0	0.18	0.19	0.02	0.02	0.27	0.31
2B	0.01	0	0.19	0.20	0.01	0.01	0.31	0.33
3B	0.01	0	0.19	0.20	0.01	0	0.30	0.33
4B	0.01	0	0.16	0.17	0.01	0.01	0.27	0.29
5B	0.01	0	0.16	0.17	0.02	0.02	0.26	0.30
6B	0.01	0	0.16	0.17	0.02	0.02	0.27	0.31
3C	0.01	0	0.16	0.17	0.01	0	0.26	0.27
4C	0.01	0	0.16	0.17	0.01	0	0.26	0.27
5C	0.01	0	0.16	0.17	0.01	0	0.26	0.29
7	0.01	0	0.16	0.17	0.03	0.03	0.26	0.31
8	0.01	0.01	0.14	0.15	0.03	0.04	0.25	0.32

6.5.~~1~~2 *Annualized MLC* Calculation Compliance Requirements:~~Annual *energy*~~ ~~calculations shall use the following requirements.~~

a. Weather data shall be ~~based on one of the following:~~taken exclusively from the NSRB Typical Meteorological Year Version (TMY3) file for a site with location and altitude nearest the data center site.

~~1.~~b. Weather data shall be divided into calculation ~~bins~~*bins* with a maximum 2°F (1°C) increment. *Systems* using an evaporation process will use wet-bulb with a mean coincident dry-bulb temperature for creating the ~~bins~~*bins*. *Systems* with a non-evaporative process shall use dry-bulb temperature with mean coincident ~~wet-bulb~~ moisture ratio for creating the ~~bins~~*bins*. Full hourly calculations (using 8760 *bins*, each of one hour) are also acceptable to use.

~~2.Typical Meteorological Year Version 3 (TMY3) for full hourly calculations with 8760 bins per year.~~

~~b.~~c. The *systems' energy* calculation may consider operation of *economizer* capacity in the design and available *redundant equipment* at the 100% *ITE* load condition and separately at the *ITE* part-load condition if calculated using partially loaded *equipment efficiencies*.

~~(***Informative Note:*** Mechanical *systems* can be calculated to operate at any temperature, with or without an *automatic* reset schedule; however, the fluid and air temperatures used in the calculation must not exceed the conditions specified for *equipment* selection by the design [i.e., the scheduled coil entering and leaving temperatures, the fan capacities, the presence or absence of variable-speed drives or compressor unloading features]).~~

d. For *data center* designs where heat recovery measures are being provided, Equation 6.5 shall be calculated for compliance with each of the design's heat recovery measures either "active" or "inactive" (at the discretion of the *design professional*.)

Informative Note: This Standard leaves all energy or emission savings credits available for the benefit of the data center's host or neighboring projects, without the possibility of "double counting" such energy or emission credits. Data centers can be reliable and economical all-electric heat sources for nearby buildings and industrial processes. Ideally, potential neighbors and landlords will discover that data centers are an economical way to switch from fossil fuels to a grid electric source for their needed heat. Because the success of heat recovery requires proximity between data center and neighboring buildings, any lower efficiency ITE cooling modes associated with heat export may be considered "inactive" in the *data center's annualized MLC* compliance calculation. Any on-site heat recovery measures may be shown as "active" to lower the *annualized MLC* used for compliance.

~~e.~~ e. If the *data center* uses *mechanical cooling*, the calculated rack inlet temperature and *dew point* ~~must~~ shall be within *Thermal Guidelines for Data Processing Environments*~~, 4th Edition,~~ recommended thermal envelope for more than 8460 of the hours per year. If the *data center* does not use *mechanical cooling*, this requirement does not apply.

f. ~~**6.5.1.1** ***Data Center Energy*** The *data center energy* calculations shall be completed separately for 100% and for part-load *ITE* capacity in the calculations. The system's~~ Any *UPS* and *transformer* cooling *system's* ~~loads~~ input *energy* ~~must~~ shall also be included in this term, evaluated at their corresponding part-load *efficiencies.*
g. The specific electrical losses used to calculate a project's *annualized MLC* shall be greater than or equal to the same electrical *losses* used to calculate the project's *design ELC* used for compliance.

h. Reviewable *annualized MLC* calculations shall separately report results for 100%, 75%, 50%, and 25% *ITE* capacity in the calculations.

6.5.~~1~~2.2 Calculated Quantity of Operating Units (*N*). As shown in Table 6.5.1.2, the number of HVAC units required to meet the load can vary based on *ambient air design conditions* or a host of other factors determined by the *design professional*. When *redundant equipment* is provided with automatic variable speed fan or pump drive (or other means of reducing part-load input power), it shall be permitted to be used in calculations to demonstrate compliance only ~~when the design uses partially loaded *equipment efficiencies*, and these~~ if part-load *equipment* quantities are clearly shown in the design's *annualized MLC* calculation and on the project's plans.

…

6.6.2.1 Drawings. *Construction documents* shall require that, within 90 days after the date of *system* acceptance, *record drawings* of the actual installation be provided to the *building* owner or the designated representative of the *building* owner. *Record drawings* shall include, as a minimum, the location and performance data on each piece of *equipment*; general configuration of the duct and pipe *distribution system*, including sizes; and the *terminal* air or water design flow rates. Plans shall show the location of *equipment* to be installed and locations for all deferred *equipment*. Describe amounts of mechanical & electrical *equipment* assumed (in each part-load MLC calculation) to be installed and operating during the 25%, 50%, 75% and 100% *ITE* power level in the associated MLC compliance calculation.

Modify Section 11 as follows

11. ALTERNATIVE COMPLIANCE METHOD

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Examples

For a particular *data center* in Climate Zone 1A with a single-feed *UPS* at 100% load and *Data Center ITE Design Power >300 kW*, the maximum MLC = ~~0.260~~0.30 from Table 6.5, and the maximum ELC = 0.245 from Table 8.~~5~~6. Adding the two values together provides a maximum overall *systems* design value of 0.505.

Maximum MLC Value [~~0.260~~0.30] + Maximum ELC Value [0.245] =
Maximum Overall *Systems* Value [~~0.505~~0.545]

. ...

FOR REFERENCE ONLY (not open for public review):

This addendum proposes changes to a section of the standard also being modified by Addendum h. Below is the result of the combined changes should both Addendum g and Addendum h be approved for publication.

11. ALTERNATIVE COMPLIANCE METHOD

…

Examples

For a particular *data center* in Climate Zone 1A with a single-feed *UPS* at 100% load and *Data Center ITE Design Power >300 kW*, the maximum MLC = ~~0.260~~0.30 from Table 6.5, and the maximum ELC = ~~0.245~~0.110 from Table 8.~~5~~6. Adding the two values together provides a maximum overall *systems* design value of 0.505.

Maximum MLC Value [~~0.260~~0.30] + Maximum ELC Value [~~0.245~~0.110] = Maximum Overall *Systems* Value [~~0.505~~0.41]

If the electrical *system* design produces a *design ELC* of ~~0.276~~0.185, which exceeds the maximum ELC value, a more efficient mechanical *system* can be used to offset this. If the mechanical *system* had an *annualized MLC* of ~~0.190~~0.220 then the overall *systems* design value would be less than the maximum overall *systems* design value and would demonstrate compliance with the standard.

Annualized MLC Value [~~0.190~~0.220] + *Design ELC* Value [~~0.276~~0.185] = Overall *Systems* Design Value [~~0.466~~0.405]