

DOE Commercial Building Benchmarks
New Construction
Summary of Changes from v1.1_3.1 to v1.2_4.0
October 30, 2009

Applicable Model(s)	Applicable Model Abbreviated Name(s)	Change
All models	(all)	Run with EnergyPlus v4.0 instead of 3.1.
All models	(all)	Updated header text to reflect changes.
All models	(all)	Exterior lighting changed from 5.0 W/ft to 0.2 W/ft ² .
All models	(all)	Added 30 W/ft of exterior lighting for primary entrance doors and 20W/ft for other doors.
All Models	(all)	Infiltration input as flow per exterior wall area, except for attics which have 1.0 ACH infiltration.
All Models	(all)	Many internal gains input as watts/area instead of just total watts, in order to identify application of standards more easily.
All models	(all)	Mechanical ventilation controller was removed from all models.
All models	(all)	Windows entered as simple glazings instead of component constructions.
All Models	(all)	Removed unused schedules
Hospital, Large Hotel, Large Office, Medium Office, Midrise Apartment, Outpatient Health Care, Secondary Education, Small Hotel	Hospital, LgHotel, LgOff, MdOff, MRapt, OutP, Sch_sec, SmHotel	Elevator motor efficiency set to 91%.
Full Service Restaurant, Hospital, Large Hotel, Primary School, Quick Service Restaurant, Secondary School, Supermarket	FullSvcRest, Hospital, LgHotel, Sch_pri, QkSvcRest, Sch_sec, SMarket	Refrigeration equipment set to reject heat to the outdoors.
Full Service Restaurant, Hospital, Large Hotel, Primary School, Quick Service Restaurant, Secondary School	FullSvcRest, Hospital, LgHotel, Sch_pri, QkSvcRest, Sch_sec	Reduced kitchen exhaust fan flow rates by 1/3. New flow rates (ft ³ /min) are: FullSvcRest – 4,000 Hospital – 5,300 LgHotel – 4,000 Sch_pri – 3,300 QkSvcRest – 3,300 Sch_sec – 4,000
Full Service Restaurant, Hospital, Large Hotel, Primary School, Quick Service Restaurant, Secondary School	FullSvcRest, Hospital, LgHotel, Sch_pri, QkSvcRest, Sch_sec	Set the pressure rise across the dummy kitchen exhaust and transfer air fans to 0.0001 Pa (where applicable) so that the energy use would be negligible.
Full Service Restaurant, Hospital, Large Hotel, Primary School, Quick Service	FullSvcRest, Hospital, LgHotel, Sch_pri, QkSvcRest, Sch_sec	Transfer air volume flow rate adjusted to account for the reduced kitchen exhaust flow.

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Restaurant, Secondary School		
Full Service Restaurant, Quick Service Restaurant, Retail, Outpatient Health Care, Primary School, Strip Mall, Warehouse	FullSvcRest, QkSvcRest, Retail, OutP, Sch_pri, StMall, ware	Changed minimum OA schedule to reflect operating hours.
Full Service Restaurant, Hospital, Large Hotel, Primary School, Quick Service Restaurant, Secondary School	FullSvcRest, Hospital, LgHotel, Sch_pri, QkSvcRest, Sch_sec	Reduced kitchen exhaust fan flow powers by 1/3 to coincide with lower flow rates.
Full Service Restaurant, Hospital, Primary School, Quick Service Restaurant, Secondary School	FullSvcRest, Hospital, Sch_pri, QkSvcRest, Sch_sec	Changed kitchen exhaust exterior load schedule to reflect operating hours.
Hospital, Large Office, Medium Office, Primary School, Secondary School	Hospital, LgOff, MdOff, Sch_pri, Sch_sec	Raised heating temperature in all Sizing:Zone objects to 50 °C to avoid under-heating.
Full Service Restaurant, Hospital, Large Hotel, Quick Service Restaurant	FullSvcRest, Hospital, LgHotel, QkSvcRest	Electric and gas kitchen equipment schedules modified to reflect more realistic kitchen operation.
Large Office, Medium Office, Primary School, Secondary School	LgOff, MdOff, Sch_pri, Sch_sec	Lowered cooling supply temperature to 12.8 °C to avoid under-cooling.
Full Service Restaurant, Quick Service Restaurant, Small Office	FullSvcRest, QkSvcRest, SmOff	Attic insulation applied to attic floor, not to the attic roof. Soffits now have attic insulation.
Hospital, Large Office, Medium Office	Hospital, LgOff, MdOff	Hot water loop schedule set to 82.2 °C (180 °F) from a previous value of 60 °C (140 °F).
Hospital, Large Hotel, Large Office	Hospital, LgHotel, LgOff	Elevator power modeled as an exterior load to represent vented, unconditioned elevator mechanical rooms.
Full Service Restaurant, Quick Service Restaurant	FullSvcRest, QkSvcRest	Lighting and occupancy schedules changed to reflect more realistic operations.
Full Service Restaurant, Quick Service Restaurant	FullSvcRest, QkSvcRest	Heating and cooling schedules modified so that setbacks coincided with non-operating hours.
Hospital, Small Hotel, Large Hotel	Hospital, SmHotel, LgHotel	Added 1,125 W of exterior lighting to account for overhangs.
Large Hotel, Large Office, Medium Office	LgHotel, LgOff, MdOff	Changed overall sizing factor from 1.2 to 1.33.
Outpatient, Primary School, Secondary School	OutP, Sch_pri, Sch_sec	Changed overall sizing factor from 1.2 to 1.5.
Primary school, Secondary	Sch_pri, Sch_sec	All schedules now reflect lower usage in the

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school		summer season.
Retail, Strip Mall	Retail, StMall	Made occupancy 100% on winter design day for ventilation.
Full Service Restaurant	FullSvcRest	Changed model name from Sit Down Restaurant (SDRest) to Full Service Restaurant (FullSvcRest).
Hospital	Hospital	Minimum supply flow (per AIA Guide 2001) applied correctly to critical zones.
Hospital	Hospital	Systems with critical zones have design supply air conditions that now allow for better humidity control.
Hospital	Hospital	Internal gains reflect AIA 2001 Guide and 2007 Green Guide for Healthcare when ASHRAE standards provide less specific guidance.
Hospital	Hospital	Lowered cooling supply temperature to 11.1 °C to avoid under-cooling.
Hospital	Hospital	Different systems configuration and number of systems to more closely resemble AEDG Small Healthcare.
Large Hotel	LgHotel	All 6 th floor guest rooms are now on 6 th Floor DOAS system (a few used to be on 3 rd Floor DOAS system by mistake).
Large Hotel	LgHotel	DOAS corrected to be modeled as a true DOAS with 30 cfm/room, with remaining zone loads met by fan coil units.
Large Hotel	LgHotel	Central VAV system shuts off from 12am – 7am, ventilation turns down to zero during same hours, night cycle on any.
Large Hotel	LgHotel	Fan coils given zero outdoor air.
Large Hotel	LgHotel	Guest room misc. elec. load density is 14.3 W/m ² , to follow the AEDG.
Large Hotel	LgHotel	Lowered cooling supply temperature to 12.0 °C to avoid under-cooling in select zones.
Large Hotel	LgHotel	Added electric unit heater to top floor corridor to minimize heating hours unmet.
Outpatient Health Care	OutP	Corner stairs and elevator zones have 1.0 ACH design infiltration.
Outpatient Health Care	OutP	Raised heating temperature in select Sizing:Zone objects to 50 °C to avoid under-heating.
Outpatient Health Care	OutP	Replaced the v1.1_3.1 outpatient benchmark model with a modified version of the outpatient facility from the healthcare

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		advanced energy design guide.
Primary School	Sch_pri	Bathroom occupancy peaks at 10 m ² /person instead of 100 m ² /person.
Primary School	Sch_pri	Mechanical room equipment power density is 4 W/m ² instead of 10 W/m ² .
Primary School	Sch_pri	Changed PSZ system types to match those of secondary school: fans from Fan:OnOff to Fan:ConstantVolume and matched DX performance curves, any node or setpoint manager changes that followed.
Quick Service Restaurant	QkSvcRest	400 W additional lighting power added to exterior lighting object to account for the drive-through window.
Quick Service Restaurant	QkSvcRest	Changed model name from Fast Food Restaurant (FFRest) to Quick Service Restaurant (QkSvcRest).
Retail	Retail	Front entry zone has 1.0 ACH design infiltration.
Retail	Retail	Changed back space infiltration schedule to half-on (same as sales spaces) and front entry to be 100% during open hours (when doors open and close) and 25% during closed hours.
Medium Rise Apartment	MRapt	Lowered cooling supply temperature to 11.1 °C.
Secondary School	Sch_sec	Corrected zone height in one zone.
Small Hotel	SmHotel	Guest room LPD from 26.9 W/m ² to 11.84 W/m ² to match LgHotel.
Small Hotel	SmHotel	Laundry room LPD from 7.50 W/m ² to 6.46 W/m ² to match standard.
Supermarket	SMarket	Changed deli exhaust exterior load schedule to reflect operating hours.
Supermarket	SMarket	Changed bakery exhaust flow in model to 354 L/s instead of 1170 L/s.
Supermarket	SMarket	Added 2,285 cfm transfer air from sales zone to deli zone.
Supermarket	SMarket	Deli zone has 3,000 cfm exhaust.