

Temperature Control With Central Energy Recovery Units

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I mentioned that the [DDC \(Direct Digital Control\)](#) systems actually work, and that our specifications call for maintaining the room temperatures within plus or minus 1.5° F. I need to explain this precision in more detail because the performance of the control system is always limited by the basic system design. And this also relates to whether or not to have limits on room setpoint adjustment.

In this case, the plus or minus 1.5° F applies only when room heating is taking place. With energy-efficient design and construction, occupied classrooms need heat only when the outside air temperature is quite cold. The actual "balance point" temperature will be different for each room, direction of the windows, amount of sunshine, etc., but can be as low as the 40's F. When heat is being added to the room, the temperature will be maintained close to the setpoint of, say, 70° F.

When no heat is being added, the room temperature is basically "out of control" and is at the mercy of the ventilation air being supplied by the Energy Recovery Unit. As you know, the amount of ventilation air being supplied to each classroom is not enough to cool it once the outside air temperature rises above a certain point, say, 50° F.

Also, the same temperature ventilation air is supplied to a number of different rooms which may have quite different heating/cooling needs because they face different directions, etc. A fairly complicated "voting" process is done by the control system to determine the "correct" temperature at any one time. But because there are many independent rooms, the same temperature will often not be optimum for all the rooms.

In any case, above a certain outside air temperature, each room will start overheating above its heating setpoint. The plus or minus 1.5° F will no longer apply. As room temperature continues to rise, windows will have to be open to maintain comfort. (Windows may need to be open at outside air temperatures as low as 50° F, which is somewhat undesirable as cool air will fall to the floor and tend to make people's feet cold).

Therefore, because during school occupied hours, occupied classrooms spend a high portion of the time with their heating valves completely closed, the heating setpoint has relatively little effect on energy consumption, and limits on setpoint adjustment also have relatively little effect.