

# LOAD ESTIMATING - DAD'S CLASS 26 Sept

Loads => what contributes to bringing in heat that you need to cool  
 $Q = UA\Delta T$

what contributes to cooling load in this room?

Outside => temp, outside air that comes in  
Solar  
↳ 2 ways air gets in  
1. infiltration (uncontrolled)  
2. ventilation (bring it in on purpose)

inside => people, lights, appliances

Other factors in other places?

tanning beds! low motors  
28000 BTUs per bed!

## OUTSIDE AIR

get blast of cold air at restaurants because of infiltration (kitchen sucks air in in the winter because cooks keep kitchen hot) - So restaurants try to use ventilation to alleviate the problem

most houses don't have ventilation, they rely on infiltration  
1. moisture  
2. stuffy  
when in new houses they seal all drafts

\* there are codes for how much ventilation non-residence buildings have to have

You have to put out what you're taking in, otherwise you pressurize the building!  
That's why some doors stay wide open

Formulas for air loads < ~~500~~  $1.1 \times CFM \times \Delta T$   
 $.69 \times CFM \times \Delta T$   
cubic feet per minute

TEMP  
can calculate any U value for any wall substance  
can know area (A) and  $\Delta T$  is change in temp  
So can calculate what temp does to building

## PEOPLE

put out heat and moisture. There are tables to tell how much heat people put out.

Generally Seated = 230 BTU sensible + 200 BTU latent

Keep the S and the L loads separate

## LIGHTS

watts converted to heat. fluorescents give more heat than regular bulbs  
Both the light and the waste heat count  
1 watt = 3.415 BTUs

40 watt space heater puts out same heat as a 40 watt light bulb

APPLIANCES  
it depends on how they run you don't need air conditioning based on the chance every appliance will be working all the time. you use a DIVERSITY to estimate the usage  
 $1 \text{ watt} = 3.415 \text{ BTUs}$

Some buildings use their lights as a heating device. Why buy a boiler? Cost effectiveness of fuel must be considered, but there's nothing wrong with using lights

So you guess with a percentage and use you can also ask the tanning bed manufacturer.

If we're bringing in ventilation, we know our CFM. But if we rely on infiltration, how do we know?

Infiltration  $CFM = ACH \times \frac{VOL}{60}$

how much air comes into building  
air change per hour  
all of air in the room is replaced

ACH as a function of tightness chart. Buildings are classified as loose, medium or tight (weather seals, etc) and also the design temperature for outside air

-10° for winter in Georgia, medium building, 36 x 20 x 9  
this room

CFM = .93 ACH x  $\frac{6480 \text{ ft}^3}{60} = 100.44 \text{ CFM}$

almost all air recycles in one hour  
can use in formula loads for air