TABLE 4. CAPACITY BALANCES FOR MAXIMUM AND MINIMUM LOAD CONDITIONS

CONDITIONS	CAPACITY IN TONS			RATIO $\frac{\text{TOTAL}}{\text{SENSIBLE}}$
	Total	Sensible	Latent	
Required at peak load conditions	10.90	7.90	3.00	1.38
Required at minimum load conditions	6.62	3.36	3.26	1.98
Peak load equipment balance	10.90	7.90	3.00	1.38
Same equipment balanced at minimum load conditions	9.85	6.58	3.26	1.50
Same equipment balanced at maximum load conditions with 40 per cent by-pass	8.38	5.05	3.33	1.66
Same equipment balanced at minimum load conditions with 38,800 Btu per hour reheat	6.62	3.36	3.26	1.98

usual coils for comfort installations, this will not occur unless the evaporating temperature at the coil outlet is about 20 to 25 F. The exact value depends on the design of coil and the amount of loading. Although it is not customary to choose coil and condensing units to balance at low temperatures at peak loads, there is danger of this occurring when the load decreases. This is further aggravated if a by-pass is used so that less air is passed through the coil at light loads. It may be even worse if the control is arranged for decrease of inside temperature with fall of that outside. Freezing can be avoided by making the full load balance a high evaporating temperature and checking the balance at the minimum load condition.

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PROBLEMS IN PRACTICE

1 ● Why are extended surface coils used in preference to plain tube coils and where is the advantage greatest and least?

Extended surface is used to increase the flow of heat between an air stream and the external surface of a tube, where the resistance through the tube wall and from tube wall

to medium flowing in the tube are proportionately low. Where the latter resistances are very low as compared to the external resistance, as with dry air flowing over tube containing water at high velocity, it is economical to use large ratios of extended to tube surface. Where the external resistance is already low, as where large quantities of water are sprayed over the surface, lower ratios are used, sometimes even plain tube coils.

2 ● On what one feature of construction does the performance of extended surface coils largely depend?

An intimate and permanent bond between tube and fin.

3 ● What is the maximum number of fins per inch and why?

Eight fins per inch is the usual practical maximum. A closer fin spacing causes trouble with dirt accumulation and by holding up water between the fins when on dehumidifying duty.

4 ● What is the purpose of the liquid distributor in volatile refrigerant coils?

The distributor is used to apportion the incoming liquid and gas mixture as evenly as possible between the individual refrigerant circuits through the coil, at the same time making it practical to arrange these circuits for a low refrigerant pressure drop.

5 ● What is the usual practice as to the relative direction of flow of air over the tubes and the liquid or vapor in the tubes?

With water and brine, counter-flow is used wherever possible. Volatile refrigerant coils are generally arranged for parallel-flow although cross-flow and combination arrangements are also used. Steam heating coils are usually arranged for cross-flow.

6 ● What factors influence the transfer of heat from the air to fluid in the tubes?

The magnitude of the propelling force or temperature difference. The design and surface arrangement of the coil. The velocity and character of the air stream. The velocity and character of the fluid in the tubes.

7 ● What effect has air velocity on the heat transfer?

It has been found that the relation between total heat transfer coefficient and mass air velocity can be represented as a straight line on logarithmic paper. The slope varies with the coil design, number of rows deep and the fluid in the tubes.

8 ● Why do practical coil applications sometimes fall short of rated capacity?

To attain rated capacity it is necessary that the incoming air be uniformly distributed over the coil face. Sometimes this is not attained due to poor layout of apparatus and air connections.

9 ● What are the three general conditions of operation to which cooling coils are subjected in practice?

The coil may be entirely dry, part dry and part wet, or wet throughout, the conditions being based upon whether or not any, part or all of the coil surface is below the dew-point temperature of the air passing over it.

10 ● What is the load-ratio line for a cooling and dehumidifying coil?

It is a straight line drawn on a non-logarithmic psychrometric chart through points representing the entering and leaving air conditions. The slope of this line gives directly the relationship between the sensible and latent cooling corresponding to the selected entering and leaving air conditions.

11 ● Upon what does the selection of a heating or cooling coil depend?

An economic analysis of each case should be made together with the relative importance of space, air resistance and quantity, and available or desirable temperatures of heating and cooling media. For a specific design of coil there are a number of possible arrangements for the same duty.