TABLE 8. PRESSURE LOSSES IN DICHLORODIFLUOROMETHANE DISCHARGE OR HOT GAS LINES[a]

CAPACITY BTU PER HOUR	PRESSURE DROP IN POUNDS PER SQUARE INCH PER 100 FT[b] — LINE SIZES, INCHES									
	5/8	7/8	1 1/8	1 3/8	1 5/8	2 1/8	2 5/8	3 1/8	3 5/8
10,000	2.3	1.0	0.6						
15,000	4.9	2.0	1.0						
20,000	8.5	3.4	1.7	0.6					
25,000		5.3	2.6	0.9					
30,000		7.5	3.6	1.2	0.5				
40,000			6.4	2.1	0.7				
50,000			9.8	3.1	1.0	0.5			
60,000				4.4	1.3	0.7			
70,000				6.0	1.9	0.9			
80,000				8.0	2.5	1.1			
90,000				10.2	3.1	1.4			
100,000					3.8	1.7	0.5		
125,000					6.0	2.6	0.7		
150,000					8.5	3.8	1.0		
175,000					11.6	5.1	1.3		
200,000						6.7	1.7	0.6	
250,000						10.4	2.6	0.9	
300,000							3.7	1.2	0.5
400,000							6.7	2.2	0.9
500,000							10.5	3.5	1.5	0.7
600,000								5.0	2.1	1.0
800,000								9.0	3.8	1.8
1,000,000									5.8	2.9
1,250,000									9.5	4.4
1,500,000										6.4
2,000,000										11.3

[a]Soft annealed copper tubing up to and including 3/4 in. outside diameter. Hard copper pipe 7/8 in. outside diameter and larger.

[b]Length of tubing includes the average number of fittings.

requiring double suction risers, one large and one small. The large riser should be trapped to insure oil return while the small riser should be sized for a velocity of 3,000 fpm at minimum load; and the large riser then sized to handle the balance of the load at a velocity not less than 2,000 fpm. The total pressure loss in the suction piping, including valve losses, is usually between 2 and 3 psi while hot gas line losses are held to approximately 4 psi and liquid line losses are not greater than 5 psi.

As protection against re-condensation on the cylinder head of the compressor, a surge drum is sometimes installed in the discharge line close to the compressor; this protection is especially desirable on systems using evaporative condensers where sun effect during shut-down may be serious.

The Steam Jet System

The steam jet system under certain circumstances is desirable for use in air conditioning[1]. Steam supplies directly the power used for compressing the refrigerant, thus eliminating the losses connected with other methods of supplying energy. As the compression ratio between the evaporator and condenser under normal circumstances is large, the mechanical efficiency of the equipment is somewhat lower than that of the positive mechanical type compressor. The condensing water requirements are considerably greater, as both the refrigerant and the impelling steam must be condensed.

TABLE 9. PRESSURE LOSSES IN DICHLORODIFLUOROMETHANE LIQUID REFRIGERANT LINES

CAPACITY BTU PER HOUR	PRESSURE DROP IN POUNDS PER SQUARE INCH PER 100 FT[a] — PIPE SIZES, INCHES			
	7/8	1 1/8	1 3/8	1 5/8
100,000	0.6			
125,000	0.9			
150,000	1.3			
175,000	1.8			
200,000	2.3	0.6		
225,000	2.9	0.8		
250,000	3.6	1.0		
275,000	4.3	1.2		
300,000	5.1	1.4		
325,000	5.9	1.6		
350,000	6.9	1.8		
375,000	7.9	2.1		
400,000	9.0	2.3	0.8	
450,000		2.9	1.0	
500,000		3.5	1.3	
550,000		4.3	1.5	0.7
600,000		5.0	1.8	0.8
700,000		6.7	2.4	1.1
800,000		8.7	3.1	1.4
900,000			3.9	1.7
1,000,000			4.7	2.1
1,200,000			6.7	3.0
1,400,000			9.0	4.0
1,600,000				5.1
1,800,000				6.3
2,000,000				7.9
2,200,000				9.2

[a]Length of tubing includes the average number of fittings.

The steam jet system functions on the principle that water under high vacuum will vaporize at low temperatures. Steam jet boosters or compressors of the type commonly used in power plants for various processes will produce the necessary low absolute pressure to cause evaporation of the water.

A diagrammatic representation of a typical steam ejector water cooling system is shown in Fig. 2. The figures correspond to an average representative system. The water to be cooled enters the evaporator and is cooled to a temperature corresponding to the vacuum maintained. Because of the high vacuum, a small amount of the water introduced in the evaporator is flashed into steam. As this requires heat, and the only source of heat is the rest of the water in the evaporator tank, this other water is almost instantly cooled to a temperature corresponding to the boiling point determined by the vacuum maintained. The amount of water flashed into steam is a small percentage of the total water circulated through the evaporator, amounting to approximately 11 lb per hour per ton of refrigeration developed. The remainder of the water at the desired low temperature is pumped out of the evaporator and used at the point where it is required.

The ejector compresses the vapor which has been flashed in the evaporator, plus any entrained air taken from the circulated water, to a somewhat higher absolute pressure and the vapor and air mix with the impel-