

Resources

Quick Load Calculations

For Walk-in Coolers & Freezers

Applications Note

The Quick Calculations Table gives 'Typical' and 'Heavy' load estimates BASED on the conditions for each room temperature. Conditions include construction, loading, and room surroundings. IF your conditions are very DIFFERENT from the 'Typical' or 'Heavy' conditions, then figure a load estimate specifically for your job.

Here are three suggestions to get an accurate load estimate for your specific application:

1. Utilize the Heatcraft ProSelect™ software.
2. Contact your local Sales Representative for help.
3. Utilize the paper and pencil calculation in Heatcraft's Engineering Manual (H-ENGM0408).

Room Conditions for Loads Shown in the Quick Calculations Table

FOR 35°F LOAD CALCULATION

The calculation is for a product entering a room during a 24 hour period. The amount of entering 'hot' product (pounds) is twice the room volume (cu ft). The entering product temp is 40°F. The product temp is reduced to 35° in 24 hours. The specific heat of the product is 0.90 BTU per pound. The freezing temp of the product is 27°.

The insulation in the ceiling and walls is 4" of styrofoam. The ceiling temp is 115°, solar effect. The wall temperatures are 95°. The R value for the styrofoam is 16.7, the k factor is 0.24. The floor is 6" of concrete on grade. The floor temp is 55°. The R value of the concrete is 4.8, the k factor is 1.25.

Air enters through the door at 95° and 50% relative humidity. The door openings cause TWICE number of air changes listed in tables that estimate 'AVERAGE AIR CHANGES FOR STORAGE ROOMS': Table 4, page 14, Heatcraft Engineering Manual (H-ENGM0408).

The motor load is charged at 1 HP per 16,000 CU FT of room volume. The lighting load is 1 watt per SQ FT of floor area. The 'people load' is figured at 1 person per 25,000 CU FT of room volume.

A 10% safety factor is added to the product, wall transmission, door infiltration, and miscellaneous loads above.

BTUH is based on SIXTEEN hour runtime. The BTU load for 24 hours is divided by 16 hours to yield the hourly heat load.

For 'Heavy Load' Conditions: People load is 1 person. Pounds of product is 3 times the rooms cubic feet.

Ten Foot box height load estimates: Add 15% to the loads listed for 8' height.

FOR 30°, 0°, -10°, -20°F. LOAD CALCULATIONS

The calculation is for a product entering a room during a 24 hour period. The amount of entering 'hot' product (pounds) EQUALS the room volume (cu ft). The entering product temp is 10°F warmer than the room temp. The product temp is reduced to the room temp in 24 hours. The specific heat of the product is 0.90 BTU per pound for the 30° room. The specific heat of the product is 0.45 BTU per pound for the 0°, -10°, and -20° rooms. The freezing temp of the product is 27°.

The insulation in the ceiling, walls, AND FLOOR is 4" of URETHANE. The ceiling temp is 115°, solar effect. The wall temperatures are 95°. The R value for the urethane is 25, the k factor is 0.16. The floor temp is 55°.

Air enters through the door at 95° and 50% relative humidity. The door openings cause TWICE number of air changes listed in tables that estimate 'AVERAGE AIR CHANGES FOR STORAGE ROOMS': Table 5, page 14, Heatcraft Engineering Manual (H-ENGM0408).

The motor load is charged at 1 HP per 12,500 CU FT of room volume.

The lighting load is 1 watt per SQ FT of floor area. The 'people load' is figured at 1 person per 25,000 CU FT of room volume.

A 10% safety factor is added to the product, wall transmission, door infiltration, and miscellaneous loads above.

BTUH is based on a EIGHTEEN hour runtime. The BTU for 24 hours is divided by 18 hours to yield the hourly heat load.

Additional Tables For Special Rooms or Boxes & Conditions

Meat Cutting / Prep Room		
Floor Square Feet	BTUH per sq. ft. of Floor Area	
	55° F	50° F
100	93	105
200	88	99
300	85	95
400	81	90
500	78	87
600	75	85
700	72	81
800	69	78
900	67	75
1000	65	73
1200	62	69

Loads based on continuous operation and include allowances for avg. number of personnel, processing equipment, etc., with glass panel in one wall and walls and ceilings insulated with 3 inches of styrene, with box located in air conditioned area. Evaporator should be below outlet velocity type to avoid drafts and should be selected for continuous operation and not less than 30° F evaporator temperature.

-10° F to 0° F Reach-ins		35° F to 40° F Reach-ins	
Room Volume CU FT	Approx BTUH	Room Volume CU FT	Approx BTUH
4 - 10	1000	4 - 10	950-1150
11 - 18	1350	11 - 18	1100-1300
19 - 35	1900	19 - 35	2100
36 - 55	2900	36 - 55	2600
56 - 75	4200	56 - 75	3500
76 - 100	5500	76 - 100	5700

Based on a minimum 1-1/2 inch urethane foam insulated fixture, 18 hours per day compressor run time.

Based on a minimum 1 inch urethane foam insulated fixture, 16 hours per day compressor run time.

Reach-in Glass Door Loads	
Room Temp.	BTUH per Door
+35° F	1060
+30° F	960
0° F	1730
-10° F	1730
-20° F	1730

Glass door loads have been adjusted for run time load. Multiply number of doors by the door load listed and add to hourly heat load in the table of quick calculations.

Resources

Quick Load Calculations

For Walk-in Coolers & Freezers

Table of Quick Calculations in BTUH

Based on 95 F ambient. Add 15% to loads for 10' height.

Room Dimensions (in.)			Room Area (Sq FT)	Room Volume (CU FT)	+35°F Room		+30°F Room		0°F Room		-10°F Room		-20°F Room	
W	L	H			Typical Load (BTUH)	Heavy Load (BTUH)	Typical Load (BTUH)	Heavy Load (BTUH)	Typical Load (BTUH)	Heavy Load (BTUH)	Typical Load (BTUH)	Heavy Load (BTUH)	Typical Load (BTUH)	Heavy Load (BTUH)
6	6	8	36	288	4,986	6,540	3,483	5,190	4,522	6,570	4,859	7,070	5,187	7,570
6	8	8	48	384	5,884	7,470	4,095	5,910	5,296	7,390	5,692	7,960	6,076	8,510
6	10	8	60	480	6,729	8,350	4,668	6,590	6,020	8,170	8,573	10,890	6,908	9,390
8	8	8	64	512	6,939	8,570	4,812	6,760	6,193	8,360	6,654	8,990	7,104	9,610
8	10	8	80	640	7,934	9,600	5,485	7,580	7,032	9,270	7,555	9,960	8,066	10,640
8	12	8	96	768	8,887	10,590	6,126	8,360	7,830	10,140	8,413	10,890	8,982	11,620
8	14	8	112	896	9,808	11,550	6,744	9,120	8,597	10,980	9,239	11,790	9,865	12,580
8	16	8	128	1,024	10,626	12,410	7,343	9,860	9,341	11,790	10,039	12,660	10,720	13,500
8	18	8	144	1,152	11,581	13,410	7,927	10,580	10,065	12,580	10,818	13,510	11,553	14,410
8	20	8	160	1,280	12,588	14,310	9,078	11,740	11,402	13,800	12,225	14,780	13,031	15,730
8	22	8	176	1,408	13,434	15,190	9,639	12,440	12,097	14,570	12,973	15,600	13,830	16,600
8	24	8	192	1,536	14,267	16,060	10,192	13,130	12,779	15,320	13,708	16,400	14,617	17,460
8	26	8	208	1,664	15,585	17,420	10,736	13,820	13,451	16,060	14,432	17,200	15,392	18,310
8	28	8	224	1,792	16,398	18,270	11,273	14,490	14,115	16,800	15,146	17,980	16,156	19,140
8	30	8	240	1,920	17,203	19,120	11,804	15,170	14,770	17,520	15,851	18,760	16,912	19,970
8	32	8	256	2,048	18,001	19,960	12,330	15,830	15,417	18,240	16,549	19,520	17,659	20,780
10	10	8	100	800	9,072	10,790	6,252	8,520	7,980	10,310	8,573	11,070	9,152	11,810
10	12	8	120	960	10,164	11,930	6,984	9,430	8,883	11,300	9,543	12,130	10,187	12,940
10	14	8	140	1,120	11,221	13,040	7,691	10,310	9,752	12,250	10,477	13,150	11,185	14,020
10	16	8	160	1,280	12,398	14,120	8,956	11,610	11,224	13,630	12,028	14,580	12,815	15,520
10	18	8	180	1,440	13,406	15,170	9,626	12,460	12,045	14,530	12,911	15,550	13,758	16,550
10	20	8	200	1,600	14,890	16,710	10,282	13,290	12,849	15,430	13,775	16,500	14,682	17,560
10	24	8	240	1,920	16,823	18,740	11,560	14,920	14,413	17,170	15,457	18,360	16,480	19,530
10	28	8	280	2,240	18,709	20,720	12,804	16,520	15,931	18,860	17,090	20,170	18,227	21,460
12	12	8	144	1,152	11,391	13,220	7,805	10,460	9,887	12,410	10,621	13,310	11,338	14,190
12	14	8	168	1,344	12,728	14,470	9,177	11,910	11,483	13,920	12,305	14,890	13,108	15,850
12	16	8	192	1,536	13,887	15,680	9,948	12,890	12,423	14,970	13,314	16,010	14,185	17,030
12	18	8	216	1,728	15,518	17,370	10,700	13,850	13,338	15,990	14,297	17,100	15,236	18,180
12	20	8	240	1,920	16,633	18,550	11,438	14,800	14,235	16,990	15,260	18,160	16,246	19,300
12	22	8	264	2,112	17,732	19,710	12,164	15,740	15,115	17,970	16,206	19,220	17,274	20,430
14	14	8	196	1,568	14,046	15,850	10,054	13,030	12,547	15,110	13,446	16,160	14,326	17,190
14	16	8	224	1,792	15,828	17,700	10,907	14,130	13,580	16,260	14,554	17,390	15,509	18,490
14	20	8	280	2,240	18,329	20,340	12,560	16,270	14,587	17,520	16,696	19,780	17,795	21,030
14	24	8	336	2,688	20,756	22,910	14,597	18,800	15,574	18,750	19,202	22,530	20,441	23,920
16	16	8	256	2,048	17,240	19,200	11,842	15,340	14,704	17,530	15,761	18,740	16,795	19,920
16	20	8	320	2,560	19,987	22,100	14,093	18,160	17,318	20,420	18,533	21,790	20,124	23,530
16	24	8	384	3,072	22,656	24,930	15,846	20,480	19,416	22,800	20,786	24,320	22,129	25,820
18	18	8	324	2,592	20,132	22,260	14,189	18,290	17,429	20,550	18,652	21,930	19,850	23,270
18	20	8	360	2,880	21,615	23,830	15,164	19,580	18,592	21,870	19,900	23,330	21,182	24,760
18	24	8	432	3,456	25,018	27,410	17,071	22,120	20,863	24,460	22,336	26,090	23,781	27,680
20	20	8	400	3,200	23,713	26,030	16,216	20,990	19,842	23,300	21,240	24,850	22,611	26,370
20	24	8	480	3,840	27,005	29,370	18,854	24,190	22,911	26,530	24,503	28,260	26,066	29,950
20	28	8	560	4,480	30,084	32,650	22,108	28,150	25,289	29,260	27,054	31,160	28,788	33,030
20	32	8	640	5,120	33,608	36,370	23,277	30,020	28,058	32,380	29,993	34,450	31,894	36,490
20	36	8	720	5,760	36,595	39,550	25,219	32,670	30,347	35,020	32,449	37,260	34,516	39,460
20	40	8	800	6,400	40,190	43,200	27,714	35,730	33,231	38,070	35,515	40,470	37,762	42,840
40	24	8	960	7,680	45,633	49,040	31,681	41,100	37,745	43,290	40,316	45,980	42,487	48,270
40	28	8	1,120	8,960	51,628	55,280	35,721	46,410	42,361	48,420	45,232	51,390	48,059	54,320
40	32	8	1,280	10,240	57,408	61,460	39,570	51,670	46,722	53,490	49,870	56,730	52,973	59,940
40	36	8	1,440	11,520	63,278	67,580	43,516	56,880	51,218	58,500	54,656	62,020	58,047	65,490
40	40	8	1,600	12,800	68,954	73,650	47,289	62,060	55,479	63,460	59,186	67,250	62,848	71,000