



COMMERCIAL HEAT GAIN - HEAT LOSS CALCULATION LOAD FORM

Job Name: _____

Address: _____

Phone/Fax/Email: _____

Contractor: _____

Address: _____

Phone/Fax/Email: _____

Heat Gain Summary

Sensible Heat (Btu/h)

Latent Heat (Btu/h)

Total Heat Gain (Btu/h)

Total (Tons)

Heat Loss Summary

Total (Btu/h)

DESIGN CONDITIONS - HEAT GAIN (Cooling Load)

Indoor Design Temperature	<input type="text"/>	A2	Outdoor Design Temperature	<input type="text"/>	D2
Design Grains	<input type="text"/>	B2	Daily Range	<input type="text"/>	E2
Peak Time of Day	<input type="text"/>	C2	Latitude	<input type="text"/>	F2

Equation # HG1 --> Outdoor Design Temperature Adjustment (G2)

$$= \text{Daily Range} \times \text{Factor}$$

$$= \frac{E2}{\text{Factor}} \times \text{Factor} = \text{Factor} \quad G2$$

Equation # HG2 --> Summer Design Temperature ΔT (H2) = D2 - G2 - A2

Outdoor Design Temperature		<input type="text"/>	D2
Outdoor Design Temperature Adjustment	-	<input type="text"/>	G2
Indoor Design Temperature	-	<input type="text"/>	A2
Summer Design Temperature ΔT	=	<input type="text"/>	H2

Equation # HG3 --> Equivalent Temperature Difference (ETD) Correction Factor (K2)

Steps a) $H2 - 20 =$ = I2

b) $0.5 \times (20 - E2) =$ = J2

c) $I2 + J2 =$ = K2

COMMERCIAL HEAT GAIN CALCULATIONS

1. TRANSMISSION HEAT GAIN								SENSIBLE	LATENT
	Area	x	U-value	x	Temperature Difference		Btu/h	Btu/h	
							---	---	
a) Glass							---	---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
b) Net Walls (Exterior) Use ETD							---	---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
c) Doors							---	---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
d) Partitions (Interior) Use Actual Temp. Diff.							---	---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		---	
e) Floors							---	---	
			x		x	=		---	
							---	---	
f1) Roof f2) Roof/Ceiling f3) RA Ceiling	A3						---	---	
			x		x	=		---	
			x		x	=		---	
			x		x	=		A3	
						---	---		
Δ HEAT GAIN SUB TOTAL PAGE 3							Btu/h	---	
Δ Place These Values on Page 8							SENSIBLE	LATENT	

COMMERCIAL HEAT GAIN CALCULATIONS								Page 4	
2. SOLAR RADIATION HEAT GAIN THROUGH GLASS								---	---
Glass Type (W) (D) (O)		Area	x	Solar Factor	x	Shading Factor		---	---
			x		x		=		---
			x		x		=		---
			x		x		=		---
			x		x		=		---
			x		x		=		---
			x		x		=		---
			x		x		=		---
3. INTERNAL HEAT GAINS								---	---
3a) Occupants								---	---
Activity		Number	x	Sensible	OR	Latent		---	---
1)			x		x	---	=		---
2)			x		x	---	=		---
1)			x	---	x		=	---	
2)			x	---	x		=	---	
								---	---
3b) Lights								---	---
		Number of Fixtures	x	Watts per Fixture	x	Conversion Factor		---	---
								---	---
Incandescent			x		x	3.4	=		---
Fluorescent			x		x	4.1	=		---
								---	---
3c) Appliances/Motors								---	---
		Usage Factor	x	Sensible	OR	Latent		---	---
			x		x	---	=		---
			x		x	---	=		---
			x		x	---	=		---
			x	---	x		=	---	
			x	---	x		=	---	
			x	---	x		=	---	
								---	---
				Δ HEAT GAIN SUB TOTAL PAGE 4			Btu/h		
				Δ Place These Values on Page 8				SENSIBLE	LATENT

COMMERCIAL HEAT GAIN CALCULATIONS

4. INFILTRATION HEAT GAIN

4a) Structural Infiltration

Volume of Conditioned Space

A5

Pressure Condition

C5

Quality of Construction

B5

Air Changes/Hour

D5

Structural Infiltration = $\frac{AC/hr \times Volume\ of\ Conditioned\ Space}{60\ min/hr}$ =

$$\frac{D5 \times A5}{60} =$$

CFM

E5

4b) Door Infiltration

Peak Time of Day Occupancy

F5

Number of Doors

H5

Average Length of Stay

G5

Number of Occupants

I5

Traffic Rate (TR) = $\frac{\# \text{ of Occupants} \times \text{Openings}}{\# \text{ of Doors} \times \text{Average Length of Stay}}$ J5

Summer TR

$$\frac{I5 \times 2}{H5 \times G5} =$$

J5

Door(1) CFM x # of Doors =

CFM

K5a

Door(2) CFM x # of Doors =

CFM

K5b

4c) Total Infiltration CFM

Total Infiltration = Structural Infiltration + Door(s) Infiltration

$$= E5 + K5a + K5b =$$

CFM

L5

COMMERCIAL HEAT GAIN CALCULATIONS

4d) Infiltration Heat Gain				---	---
Sensible Loads Exterior	Total Infiltration x Summer Design Temperature ΔT (H2) x 1.1			---	---
	=	x x 1.1			---
				---	---
Sensible Loads Interior	Total Infiltration x Actual Temperature Difference ΔT x 1.1			---	---
	a)	x x 1.1			---
	b)	x x 1.1			---
				---	---
Latent Loads Exterior	Total Infiltration (L5) x Design Grains (B2) x 0.68			---	---
	=	x x 0.68			---
				---	---
Interior	Total Infiltration x Design Grains x 0.68			---	---
	a)	x x 0.68			---
	b)	x x 0.68			---
				---	---
			Δ	HEAT GAIN SUB TOTAL PAGE 6	Btu/h
			Δ	Place These Values on Page 8	
				SENSIBLE	LATENT

COMMERCIAL HEAT GAIN CALCULATIONS

5. DUCT HEAT GAIN

SENSIBLE HEAT GAIN SUB TOTAL PAGE 3 =

Page 3

SENSIBLE HEAT GAIN SUB TOTAL PAGE 4 =

Page 4

SENSIBLE HEAT GAIN SUB TOTAL PAGE 6 =

Page 6

SENSIBLE SUB TOTAL Pages 3 & 4 & 6 =

A7

Supply Duct Heat Gain = ^{A7} x Duct Factor =

Return Duct Heat Gain = x =

6. VENTILATION

Number of Occupants

B7

CFM per Person

C7

Occupant CFM

= ^{B7} x ^{C7} = Total CFM ^{CFM} D7

Total Exhaust CFM

= (From Design Specifications) E7

Determine Total Ventilation

Select D7 OR E7 --> Whichever Is The Greatest CFM F7

Sensible Load = Total Ventilation (F7) x Summer Design Temperature ΔT (H2) x 1.1
 x x 1.1 =

Latent Load = Total Ventilation (F7) x Design Grains (B2) x 0.68
 x x 0.68 =

Δ HEAT GAIN SUB TOTAL PAGE 7

Btu/h

Δ Place These Values on Page 8

SENSIBLE

LATENT

COMMERCIAL HEAT GAIN CALCULATIONS

7. RETURN AIR PLENUM HEAT GAIN

								---	---
								---	---
Incandescent Lights (Watts)	<input type="text"/>	x 3.4 x 0.40 =					A8	---	---
Flourescent Lights (Watts)	<input type="text"/>	x 4.1 x 0.40 =					B8	---	---

Walls	Area	x	U-Value	x	ETD	=				
N)	<input type="text"/>	x	<input type="text"/>	x	<input type="text"/>	=	<input type="text"/>	C8	---	---
E)	<input type="text"/>	x	<input type="text"/>	x	<input type="text"/>	=	<input type="text"/>	D8	---	---
W)	<input type="text"/>	x	<input type="text"/>	x	<input type="text"/>	=	<input type="text"/>	E8	---	---
S)	<input type="text"/>	x	<input type="text"/>	x	<input type="text"/>	=	<input type="text"/>	F8	---	---

Roof	Area	x	U-Value	x	ETD	=	<input type="text"/>	G8	---	---
Sub Total = A8 + B8 + C8 + D8 + E8 + F8 + G8							=	<input type="text"/>	H8	---

			H8	-	A3				---	---
	Return Air Plenum Heat Gain =	<input type="text"/>		-	<input type="text"/>	=			---	---

		Δ	HEAT GAIN SUB TOTAL PAGE 8		Btu/h		---
--	--	---	----------------------------	--	-------	--	-----

							SENSIBLE	LATENT
--	--	--	--	--	--	--	----------	--------

8. TOTAL HEAT GAIN SUMMARY

		Δ	HEAT GAIN SUB TOTAL PAGE 3	=				
		Δ	HEAT GAIN SUB TOTAL PAGE 4	=				
		Δ	HEAT GAIN SUB TOTAL PAGE 6	=				
		Δ	HEAT GAIN SUB TOTAL PAGE 7	=				
		Δ	HEAT GAIN SUB TOTAL PAGE 8	=				
		*	TOTAL HEAT GAIN (Btu/h)	=				

* Place These Values on Front Cover Page (Page 1)

Job Name: _____

DESIGN CONDITIONS - HEAT LOSS (Heating Load)

Indoor Design Temperature

A9

Indoor Design % RH

C9

Outdoor Design Temperature

B9

Equation # HL1 -->

Winter Design Temperature ΔT (D9) = A9 - B9

Indoor Design Temperature

A9

Outdoor Design Temperature

-

B9

Winter Design Temperature ΔT

D9

TOTAL HEAT LOSS SUMMARY

			SENSIBLE	
Δ	HEAT LOSS SUB TOTAL PAGE 10	=		
Δ	HEAT LOSS SUB TOTAL PAGE 12	=		
Δ	HEAT LOSS SUB TOTAL PAGE 13	=		
	* TOTAL HEAT LOSS (Btu/h)	=		

* Place This Value on Front Cover Page (Page 1)

COMMERCIAL HEAT LOSS CALCULATIONS

1. TRANSMISSION HEAT LOSS							SENSIBLE	
	Area	x	U-value	x	Temperature Difference	=	Btu/h	
							---	---
a) Glass		x		x		=		---
		x		x		=		---
		x		x		=		---
		x		x		=		---
b) Net Walls Exterior Use Actual Temp. Diff.		x		x		=		---
		x		x		=		---
		x		x		=		---
		x		x		=		---
c) Doors		x		x		=		---
		x		x		=		---
		x		x		=		---
		x		x		=		---
d) Partitions (Interior) Use Actual Temp. Diff.		x		x		=		---
		x		x		=		---
		x		x		=		---
		x		x		=		---
e) Floors		x		x		=		---
f1) Roof		x		x		=		---
f2) Roof/Ceiling		x		x		=		---
g) Slab Floors	Exposed Perimeter	x	U-value	x	Temperature Difference		---	---
		x		x		=		---
h) Below Grade Walls			Area	x	Factor		---	---
h1) 2 - 5 Feet Below Grade						=		---
h2) More than 5 Feet Below Grade						=		---
h3) Basement Floor						=		---
Δ HEAT LOSS SUB TOTAL PAGE 10						Btu/h		A10
Δ Place This Value on Page 9							SENSIBLE	

COMMERCIAL HEAT LOSS CALCULATIONS

2. INFILTRATION LOSS GAIN

2a) Structural Infiltration

Volume of Conditioned Space

A11

Pressure Condition

C11

Quality of Construction

B11

Air Changes/Hour

D11

Structrural Infiltration = $\frac{AC/hr \times Volume\ of\ Conditioned\ Space}{60\ min/hr}$ =

$$\frac{A11 \times D11}{60} =$$

CFM

E11

2b) Door Infiltration

Peak Time of Day Occupancy

F11

Number of Doors

H11

Average Length of Stay

G11

Number of Occupants

I11

Traffic Rate (TR) = $\frac{\#\ of\ Occupants \times Openings}{\# \ of \ Doors \times Average \ Length \ of \ Stay}$ J11

Winter TR

$$\frac{I11 \times 2}{H11 \times G11} =$$

J11

Door(1)

CFM x # of Doors =

CFM

K11a

Door(2)

CFM x # of Doors =

CFM

K11b

2c) Total Infiltration CFM

Total Infiltration CFM = Structural Infiltration + Door(s) Infiltration

$$= E11 + K11a + K11b =$$

CFM

L11

COMMERCIAL HEAT LOSS CALCULATIONS

4. VENTILATION

Number of Occupants

CFM per Person

A13

B13

Occupant CFM

$$= \frac{A13 \times B13}{x} = \text{Total CFM} \quad C13$$

Total Exhaust CFM

$$= \text{[] (From Design Specifications)} \quad D13$$

Determine Total Ventilation

Select C13 OR D13 --> Whichever Is The Greatest CFM E13

Sensible Load

$$\text{Total Ventilation (E13)} \times \text{Winter Design Temperature } \Delta T \text{ (D9)} \times 1.1$$

$$= \frac{\text{[]} \times 1.1}{x}$$

5. HUMIDIFICATION REQUIREMENTS

Total Infiltration CFM (L11) + Total Ventilation CFM (E13) = Total CFM

$$\text{[]} + \text{[]} = \text{[]} \quad F13$$

Sensible Heat Loss = $\frac{\text{Total CFM (F13)} \times \text{Humidification Heat Loss}}{100}$

$$= \frac{\text{[]} \times \text{[]}}{100} \quad G13$$

Δ HEAT LOSS SUB TOTAL PAGE 13

Btu/h

Δ Place This Value on Page 9

SENSIBLE

COMMERCIAL HEAT GAIN - HEAT LOSS CALCULATION LOAD FORM

CALCULATIONS AND NOTES

