MECHANICAL AND ELECTRICAL

PROJECT :- ABU JABER HOUSE AREA :- GROUND FLOOR

SUBJECT :- LIGHT LEVEL CALCULATION TABLE

ROOM NO.	DIM:- LXW XH	ROOM INDEX	INITIAL LUM. OUT PUT	MAIN FACTOR	UTILIZ. FACTOR	ARRANGEMENT DESIGN E/ in LUX.	RECOMMENDED E/ in LUX.	PURPOSE
G7	4.7*3.5*3.0	0.7	9753.0	0.8	0.335	158.90	150	GEN.LIGHT
(*)	2.15*1.25*2.15	0.4	11050	0.8	0.20	657.80	400	COUNTER
G12	6*4.4*3.0	0.85	18600.0	0.8	0.60	338.20	250	UTILITY
G13	3.75*5.0*3.0	0.7	11040	0.8	0.32	150.70	150	GENERAL
G14/1	3.1*4.0*3.0	0.58	24500	0.8	0.50	790.00	500	EXHIPIT.
G14/2	2.5*3.75*3.0	0.5	11040	0.8	0.20	188.00	150	GENERAL
G15	9.4*3.9*3.0	0.92	30920	0.8	0.60	404.80	400	EXHIPIT
G16	6.75*5.75*3.0	1.035	11870	0.8	0.63	154.14	150	GEN.LIGHT
*	5.0*1.5*2.15	0.54	23200	0.8	0.27	668.00	500	EXHIPIT
G17	6.0*5.6*3.0	0.97	14720	0.8	0.35	123	100	GENERAL
G18	5.5*3.7*3.0	0.52	10840	0.8	0.23	96.00	75	GENERAL
G19	5.37*4.325*3.0	0.81	20160	0.8	0.60	411.00	400	EXHIPIT

$$Eav = \frac{Inl \times MF \times UF}{A}$$

WHERE:- Inl= INITIAL LUMENS OUT PUT
MF= MAINTENANCE FACTOR
UF = UTILIZATION FACTOR

$$Ri = \frac{L \times W}{H(L + W)}$$

WHERE:- RI = ROOM INDEX
H = HEIGHT OF WORKING PLAN
L = ROOM LENGTH
W = ROOM WIDTH

PROJECT :- ABU JABER HOUSE AREA :- FIRST FLOOR

SUBJECT :- LIGHT LEVEL CALCULATION TABLE

ROOM NO.	DIM:- LXW XH	ROOM INDEX	INITIAL LUM. OUT PUT	MAIN FACTOR	UTILIZ. FACTOR	ARRANGEMENT DESIGN E/ in LUX.	RECOMMENDED E/ in LUX.	PURPOSE
F2	5.0*4.5*3.0	0.7	25140	0.8	0.56	500	500	EXHIPIT
F3	6.25*3.75*3.0	0.8	8280	0.8	0.60	169	150	GENERAL
F3*	3.125*2.5*3.0	0.5	18880	0.8	0.45	850	500	EXHIPIT
F4	5.0*3.75*1.85	1.16	23760	0.8	0.61	618	500	EXHIPIT
F1	7.5*5.0*3.0	1.0	23100	0.8	0.60	296	15	GENERAL
F1	3.75*2.5*1.85	0.8	16200	0.8	0.55	760	500	EXHIPIT
F5	4.125*3.375*3.0	0.62	9660	0.8	0.35	194	150	GENERAL
F6	3.125*2.5*3.0	0.5	4730	0.7	0.25	105	100	UTILITY
F7/1	5.6*3.75*2.2	1.0	5520	0.8	0.60	126	90	CORREDOR
F7/2	10*5.0*2.2	1.5	11340	0.8	0.62	112	90	BALCONY
F9	6.25*1.25*3.0	2.0	4140	0.8	0.65	275	120	STAIR WAY
F10/1	4.375*3.12*1.85	1.0	23760	0.8	0.60	835	500	EXHIPIT
F10/2	7.5*3.5*1.85	1.3	37200	0.8	0.63	714	500	EXHIPIT
F11	3.125*2.5*3.0	0.46	6700	0.7	0.20	120	100	UTILITY
F12	3.4*2.5*1.85	0.78	10500	0.8	0.58	573	500	EXHIPIT
F13/1	3.75*3.1*1.85	0.92	11880	0.8	0.60	490	500	EXHIPIT
F13/2	4.25*2.5*1.85	0.85	14700	0.8	0.60	664	500	EXHIPIT
F14	5.0*4.7*3.0	0.8	15180	0.8	0.60	310	300	PUBLIC
F16	4.25*2.5*3.0	0.54	9660	0.7	0.25	159	150	TOILET
F17	9.4*3.75*1.85	1.34	39400	0.8	0.62	554	500	EXHIPIT
F18	6.75*4.5*1.85	1.45	29280	0.8	0.63	486	500	GEN.+EXH.
F19	5.0*3.12*1.85	1.00	26520	0.8	0.60	816	500	EXHIPIT
F20	4.8*3.25*1.85	1.00	26520	0.8	0.60	816	500	EXHIPIT

PROJECT :- ABU JABER HOUSE AREA :- SECOND FLOOR

SUBJECT :- LIGHT LEVEL CALCULATION TABLE

ROOM NO.	DIM:- LXW XH	ROOM INDEX	INITIAL LUM. OUT PUT	MAIN FACTOR	UTILIZ. FACTOR	ARRANGEMENT DESIGN E/ in LUX.	RECOMMENDED E/ in LUX.	PURPOSE
S1	5.0*5.6*2.2	1.2	5520	0.8	0.65	94.00	90-100	YARD
S2	6.0*2.5*3.0	0.6	13260	0.8	0.40	339	300	PUBLIC
S3	5.0*4.0*3.0	0.75	16760	0.8	0.45	301	300	GEN.+EXH.
S4	4.85*4.0*3.0	0.75	21000	0.8	0.45	389	300	GEN.+EXH.
S5	6.25*5.6*3.0	1.0	8280	0.8	0.60	113	100-120	PUBLIC
S6	4.75*3.5*3.0	0.7	34400	0.8	0.38	629	500	EXHIPIT
S7	4.376*3.75*3.0	0.6	16020	0.8	0.40	312	300	GEN.+EXH.
S10	5.6*3.12*3.0	0.7	15180	0.8	0.38	264	150-200	PUBLIC
S11	7.5*3.75*3.0	0.8	24400	0.8	0.50	347	300	PUBLIC+RECEP.
S12	12.0*5.0*3.0	1.1	45500	0.8	0.60	437	400	EX.+CHILDREN
S14	5.25*4.5*3.0	0.8	16020	0.8	0.5	271	250	RECEP.
S18	5.7*4.4*3.0	0.82	12420	0.8	0.50	124	100	COURT YARD
S19	10*4.0*3.0	0.95	26220	0.8	0.8	420	400	MADAFAH
S20	5.7*5.1*3.0	0.9	12420	0.8	0.5	170	150	PUBLIC
S21	5.0*3.75*3.0	0.7	6900	0.8	0.38	111	100	REC.ROOM
S22	4.2*4.5*3.0	0.72	16020	0.8	0.4	271	200-250	DINNING RO.
S23	4.4*2.5*3.0	0.53	5520	0.8	0.30	120	100	MONEH

SOLAR GAIN FACTORS

JOB NAME :- BET ABU JABER
ESTIMATE FOR :- AUG. MONTH
ELEVATION :- 980
EQUIP OPER :- 12 HRS/DAY

LOCATION :- AL-SALT JORDAN
3PM TIME

1- EXPOSURE	NORTTH	EST	SOUTH	WEST	HORS
2- SOLAR GAIN	11	165	63	165	235
3- CORR.STEEL SASH	1.17	1.17	1.17	1.17	1.17
4- CORR.HAZE	1.0	1.0	1.0	1.0	1.0
5- CORR.ALTITUDE	1.006	1.006	1.006	1.006	1.006
6- CORR.DEW POINT	0.998	0.998	0.998	0.998	0.998
7- CORR.SOUTH LAT	1	1	1	1	1
8- STORAGE FACTOR	0.98	0.21	0.65	0.36	0.5
9- SUN GAIN	12.79	39.8	48	70	9.2
10- SHADE FACTOR	0.54	0.54	0.54	0.54	0.54

ملاحظة:-

درجات الحرارة التصميمية الخارجية ٩٠ فهرنت

درجات الحرارة التصميمية الداخلية ٧٠ فهرنت

- Design Temp (out) 90°F
- " " (in) 70°F

EQUIVALENT TEMPERETURE DIFFERENCE

COLOR	MON.LAT	CALCULTION
MEDIUM	AUG . 32	ETD=0.78 (RS/RM)+Δtem+(1-0.78Rs/Rm)Δtes

	ROOF TABL	WALL EXPOSURE TABLE				
		NORTH	EAST	SOUTH	WEST	
1- DESIGN MONTH	AUG	-	-	-	-	
2- DESIGN TIME	3PM	-	-	-	-	
3- COLOR	MED	-	-	-	-	
4- WEIGHT	70	60	-	-	-	
5- DES.D.B.TABLE-1	90	-	-	-	-	JORDAINIAN CODE
6-CORR. TABL-3	0	-	-	-	-	
7- 3PM.DB =5+6	90	-	-	-	-	
8-ROOM DES.DB	70	-	-	-	-	JORDAINIAN CODE
9- Δt = 7-8	20					
10- daily RANGE	15	-	_	-	-	
11-TABLE 20 A.COOR	7.5	-	_	-	-	
12- Δt(EX.POS) TABLE (19-20)	28	3	20	15	10	
13- Δt(EM) =12+11	35.5	10.5	27.5	22.5	17.5	
14- Rs.TABLE6 (MON-LAT)	211.2	12.8	164.4	70.8	164.4	
15- Rm.tab.6(JUL-40N)	233	15	164	69	164	
16- Rs/Rm	0906	0.85	1.002	1.02	1.02	
17- Δt(SHADE)TABLE 19OR20	4	3	3	3	3	
18- Δtes=17+11	11.5	10.5	10.5	10.5	10.5	
19ETD=0.78(Rs/Rm)Δtem+(1-0.78Rs/Rm) Δtes	28.40	10.5	29.6	20.4	16.06	

PROJECT NAME Abu Taber

SPACE NUMBER 1 FLOOR First

AREA 475 Sq Ft

VOLUME

LAT. 32.1 SUN NR 3 MONTH Aug.

CONDITION	DB	WB	RH	GR/LB	BTU/LB
OUTSIDE AIR TEMP	90	68	36%		
SPACE AIR TEMP	76	59	50%		
DIFFERENCE					
OPERATING TIME	12 HOURS				

SHEET 1 OF 6

PROJECT NR

DATE

COMPUTED BY

CHECKED BY

CEC - AIR CONDITIONING LOAD ESTIMATE SHEET

HEAT GAINS	ITEMS	AREA OR QUANTITY	GAIN ΔT	FACTOR	BTUS/HR
GLASS	N GLASS	58	x 12,8	x 1,	765
	S GLASS	24	x 48	x 1	1152
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	SHD GLASS		x	x	
	SHD GLASS		x	x	
	SKYLIGHT		x	x	
WALLS & ROOFS	N WALL	72	x 10,5	x 0,25	190
	W WALL	106	x 20,4	x 0,25	540
	WALL		x	x	
	WALL		x	x	
	WALL		x	x	
	SHD WALL		x	x	
	SUN ROOF		x	x	
	SHD ROOF		x	x	
	EXP FLOOR		x	x	
TRANSMISSION & INFILTRATION	GLASS	82	x 20	x 1	1690
	GLASS		x	x	
	GLASS		x	x	
	PARTITION	356	x 15	x 0,2	1070
	PARTITION		x	x	
	PARTITION		x	x	
	FLOOR	475	x 1.5	x 0,3	2140
	CEILING		x	x	
	INFILTRATION CFM		x	x 1.08	
	PEOPLE	15	x 245		3675
	PEOPLE		x		
	POWER HP OR KW		x		
	LIGHTS	475 x 1,25 x 3W	x	x 3.4	7280
	APPLIANCES		x		
	SUBTOTAL				18535
	SAFETY FACTOR	15 %			2780
	SPACE SENSIBLE HEAT GAINS (SSH)				21315
	LEAKAGE, DUCT AND FAN GAINS %				
	B.P.F. AIR CFM x x bf x 1.08				
	EFFECTIVE SPACE SENSIBLE HEAT GAINS (ESSH)				21315

LATENT HEAT GAINS	ITEMS	BTUS/HR
	INFILTRATION CFM x GR/LB x 0.68	
	PEOPLE 15 x 205	3075
	PEOPLE x	
	STEAM LBS/HR. x 1000	
	APPLIANCES	
	SUBTOTAL	3075
	SAFETY FACTOR 5 %	154
	SPACE LATENT HEAT GAINS (SLH)	3229
	DUCT LEAKAGE LOSSES	
	B.P.F. AIR CFMx GR/LBx bf 0.68	
	EFFECTIVE SPACE LATENT HEAT GAINS (ESLH)	3229
	EFFECTIVE SPACE SENS. HEAT GAINS (ESSH)	21315
	EFFECTIVE SPACE TOTAL HEAT GAINS (ESTH)	24590

SENSIBLE HEAT FACTOR 21315 (ESSH) / 24590 (ESTH) = 0,86

INDICATED ADP 48 °F, SELECTED ADP 48 °F

DEHUMIDIFIED AIR TEMPERATURE RISE (ΔT) = 22

(1 - bf) x (Space T 70 °F - ADP 48 °F) = 22 °F

DEHUMIDIFIED AIR VOLUME

24590 (ESTH) / 1.08 x °F DEH. AIR ΔT 22 = 1115 CFM

OUTLET TEMPERATURE DIFFERENCE (SPACE T - OUTLET AIR T)

(SSH) / 1.08 x CFM DEH. AIR

SUPPLY AIR VOLUME

(SSH) / 1.08 x °F DESIRED ΔT = CFM

ENTERING AIR: °F DB °F WB LEAVING AIR: °F DB °F WB

FRESH AIR 15 X 15 = 225 CFM

FASH 225 CFM x 28 °F (1 - bf) x 1.08 = 4860

FALH — CFM x GR/LB (1 - bf) x 0.68 =

FA TOTAL HEAT GAINS 4860

EFFECTIVE SPACE TOTAL HEAT GAINS 24590

GRAND TOTAL HEAT GAINS 29450

TONNAGE 29450 / 12,000 = 2,5 TONS

NOTES:

PROJECT NAME Abu-Taher

SPACE NUMBER 2 FLOOR First

AREA 413 SQ FT

VOLUME

LAT 32 SUN HR 3 MONTH Aug.

CONDITION	DB	WB	%RH	GR/LB	BTU/LB
OUTSIDE AIR TEMP	90	68	36%		
SPACE AIR TEMP	70	69	50%		
DIFFERENCE					
OPERATING TIME					

HOURS

SHEET 2 OF 6

PROJECT NO.

DATE

COMPUTED BY

CHECKED BY

COOLING LOAD ESTIMATE SHEET - AIR CONDITIONING

HEAT GAINS	ITEMS	AREA OR QUANTITY	GAIN ΔT	FACTOR	BTUS/HR
GLASS	N GLASS	50	x 12,8	x 1	640
	W GLASS	66	x 70	x 1	4760
	S GLASS	24	x 48	x 1	1190
	GLASS		x	x	
	GLASS		x	x	
	SHD GLASS		x	x	
	SHD GLASS		x	x	
	SKYLIGHT		x	x	
WALLS & ROOFS	N WALL	145	x 19,5	x 0,25	300
	W WALL	225	x 16	x 0,25	720
	S WALL	138	x 20,4	x 0,25	560
	WALL		x	x	
	WALL		x	x	
	SHD WALL		x	x	
	SUN ROOF		x	x	
	SHD ROOF		x	x	
	EXP FLOOR		x	x	
TRANSMISSION & INFILTRATION	GLASS	140	x 20	x 1	2890
	GLASS		x	x	
	GLASS		x	x	
	PARTITION		x	x	
	PARTITION		x	x	
	PARTITION		x	x	
	FLOOR	413	x 15	x 0,3	1860
	CEILING		x	x	
	INFILTRATION CFM		x	x 1.08	
	PEOPLE	9	x 245		2205
	PEOPLE		x		
	POWER HP OR KW		x		
	LIGHTS	413 x 1,2 x 1	W x 3.4		6320
	APPLIANCES		x		
	SUBTOTAL				21466
	SAFETY FACTOR		15 %		3220
	SPACE SENSIBLE HEAT GAINS (SSH)				24686
	LEAKAGE, DUCT AND FAN GAINS		%		
	B.P.F. AIR CFM x		x bf x 1.08		
	EFFECTIVE SPACE SENSIBLE HEAT GAINS (ESSH)				24686

ITEMS	BTUS/HR
LATENT HEAT GAINS: INFILTRATION CFM x GR/LB x 0.68	
PEOPLE 9 x 205	1845
PEOPLE x	
STEAM LBS/HR. x 1000	
APPLIANCES	
SUBTOTAL	1845
SAFETY FACTOR 5 %	190
SPACE LATENT HEAT GAINS (SLH)	1935
DUCT LEAKAGE LOSSES	
B.P.F. AIR CFMx GR/LBx bf 0.68	
EFFECTIVE SPACE LATENT HEAT GAINS (ESLH)	1935
EFFECTIVE SPACE SENS. HEAT GAINS (ESSH)	24686
EFFECTIVE SPACE TOTAL HEAT GAINS (ESTH)	26615

SENSIBLE HEAT FACTOR 24680 (ESSH) / 26615 (ESTH) = 0,9

INDICATED ADP 49 °F, SELECTED ADP 49 °F

DEHUMIDIFIED AIR TEMPERATURE RISE (ΔT) 21

(1 - bf) x (Space T 70 °F - ADP 49 °F) 21 °F

DEHUMIDIFIED AIR VOLUME

26615 (ESTH) / 1.08 x °F DEH. AIR ΔT 21 = 1170 CFM

OUTLET TEMPERATURE DIFFERENCE (SPACE T - OUTLET AIR T)

(SSH) / 1.08 x CFM DEH. AIR

SUPPLY AIR VOLUME

(SSH) / 1.08 x °F DESIRED ΔT = CFM

ENTERING AIR: °F DB °F WB LEAVING AIR: °F DB °F WB

FRESH AIR 9 x 15 = 135 CFM

FASH 135 CFM x 20 °F (1 - bf) x 1.08 = 2916

FALH CFM x GR/LB (1 - bf) x 0.68

FA TOTAL HEAT GAINS	2916
EFFECTIVE SPACE TOTAL HEAT GAINS	26615
GRAND TOTAL HEAT GAINS	29530
TONNAGE 29530 / 12,000	2,5 TONS

NOTES:

PROJECT NAME Abu Jaber

SPACE NUMBER 3 FLOOR First

AREA 270 SQ FT

VOLUME

LAT 32 SUN HR 3 MONTH Aug

CONDITION	DB	WB	%RH	GR/LB	BTU/LB
OUTSIDE AIR TEMP	90	68	36		
SPACE AIR TEMP	70	59	50		
DIFFERENCE					
OPERATING TIME					HOURS

SHEET 3 OF 6

PROJECT NO

DATE

COMPUTED BY

CHECKED BY

CFC AIR CONDITIONING LOAD ESTIMATE SHEET

HEAT GAINS	ITEMS	AREA OR QUANTITY	GAIN Δt	FACTOR	BTUS/HR
GLASS	E GLASS	20	x 39,8	x 1	820
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	SHD GLASS		x	x	
	SHD GLASS		x	x	
	SKYLIGHT		x	x	
WALLS & ROOFS	E WALL	142	x 29,6	x 0,25	846
	S WALL	195	x 20,4	x 0,25	780
	WALL		x	x	
	WALL		x	x	
	WALL		x	x	
	SHD WALL		x	x	
	SUN ROOF		x	x	
	SHD ROOF		x	x	
	EXP FLOOR		x	x	
TRANSMISSION & INFILTRATION	GLASS	20	x 20	x 1	410
	GLASS		x	x	
	GLASS		x	x	
	PARTITION	195	x 15	x 0,2	730
	PARTITION		x	x	
	PARTITION		x	x	
	FLOOR	270	x 15	x 0,3	1010
	CEILING		x	x	
	INFILTRATION CFM		x	x 1.08	
	PEOPLE	20		x 245	4900
	PEOPLE			x	
	POWER		HP OR KW	x	
	LIGHTS	270 x 1,25 x 3W		x 3.4	3300
	APPLIANCES			x	
	SUBTOTAL				14270
	SAFETY FACTOR		15	%	2100
	SPACE SENSIBLE HEAT GAINS (SSH)				16370
	LEAKAGE, DUCT AND FAN GAINS			%	
	B.P.F. AIR CFM x		x bf x 1.08		
	EFFECTIVE SPACE SENSIBLE HEAT GAINS (ESSH)				16370

ITEMS	BTUS/HR
LATENT HEAT GAINS: INFILTRATION CFM x GR/LB x 0.68	
PEOPLE 20 x 205	4100
PEOPLE x	
STEAM LBS/HR. x 1000	
APPLIANCES	
SUBTOTAL	4100
SAFETY FACTOR 5 %	2100
SPACE LATENT HEAT GAINS (SLH)	6200
DUCT LEAKAGE LOSSES	
B.P.F. AIR CFMx GR/LBx bf 0.68	
EFFECTIVE SPACE LATENT HEAT GAINS (ESLH)	6200
EFFECTIVE SPACE SENS. HEAT GAINS (ESSH)	16370
EFFECTIVE SPACE TOTAL HEAT GAINS (ESTH)	22570

SENSIBLE HEAT FACTOR 16370 (ESSH) / 20670 (ESTH) = .79

INDICATED ADP 45 °F, SELECTED ADP 45 °F

DEHUMIDIFIED AIR TEMPERATURE RISE (Δt) = 25

(1- bf) x (T space 70 °F - ADP 45 °F) = 25 °F

DEHUMIDIFIED AIR VOLUME = 20670 (ESTH) / 1.08 x °F DEH. AIR Δt 25 = 825 CFM

OUTLET TEMPERATURE DIFFERENCE (SPACE T - OUTLET AIR T)

(SSH) / 1.08 x CFM DEH. AIR

SUPPLY AIR VOLUME

(SSH) / 1.08 x °F DESIRED ΔT = CFM

ENTERING AIR: °F DB °F WB LEAVING AIR: °F DB °F WB

FRESH AIR 20 X 15 = 300 CFM

FASH 25 CFM x 20 F (1- bf) x 1.08 = 6480

FALH CFM x GR/LB (1- bf) x 0.68 =

FA TOTAL HEAT GAINS 6480

EFFECTIVE SPACE TOTAL HEAT GAINS 22570

GRAND TOTAL HEAT GAINS 22770

TONNAGE 22770 / 12,000 = 1.9 → 2 TONS

NOTES:

PROJECT NAME Abu-Jaber

SPACE NUMBER 4 FLOOR First

AREA 475 Sq Ft

VOLUME

LAT. 32 SUN HR 12 MONTH Aug

CONDITION	DB	WB	%RH	GR/LB	BTU/LB
OUTSIDE AIR TEMP	90	68	36%		
SPACE AIR TEMP	70	59	50%		
DIFFERENCE					
OPERATING TIME			HOURS		

SHEET 4 OF 16

PROJECT NO.

DATE

COMPUTED BY

CHECKED BY

CEC - AIR CONDITIONING LOAD ESTIMATE SHEET

HEAT GAINS	ITEMS	AREA OR QUANTITY	GAIN ΔT	FACTOR	BTUS/HR
GLASS	N GLASS	48,6	x 12,8	x 1	640
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	SHD GLASS		x	x	
	SHD GLASS		x	x	
	SKYLIGHT		x	x	
WALLS & ROOFS	S WALL	259	x 29,6	x 0,2	1530
	N WALL	130	x 10,5	x 0,2	270
	WALL		x	x	
	WALL		x	x	
	WALL		x	x	
	SHD WALL		x	x	
	SUN ROOF		x	x	
	SHD ROOF		x	x	
	EXP FLOOR		x	x	
TRANSMISSION & INFILTRATION	GLASS	48,6	x 20	x 1	1000
	GLASS		x	x	
	GLASS		x	x	
	PARTITION	259	x 15	x 0,2	885
	PARTITION		x	x	
	PARTITION		x	x	
	FLOOR	475	x 15	x 0,3	1780
	CEILING	475	x 15	x 0,3	1780
	INFILTRATION	CFM	x	x 1.08	
	PEOPLE	10		x 245	2450
	PEOPLE			x	
	POWER	HP OR KW		x	
	LIGHTS	475 X 1,25	13 W	x 3.4	5800
	APPLIANCES			x	
	SUBTOTAL				17685
	SAFETY FACTOR		15	%	2653
	SPACE SENSIBLE HEAT GAINS (SSH)				20338
	LEAKAGE, DUCT AND FAN GAINS			%	
	B.P.F. AIR CFM x		x bf x 1.08		
	EFFECTIVE SPACE SENSIBLE HEAT GAINS (ESSH)				20338

ITEMS	BTUS/HR
LATENT HEAT GAINS: INFILTRATION CFM x GR/LB x 0.68	
PEOPLE 10 x 205	2050
PEOPLE x	
STEAM LBS/HR. x 1000	
APPLIANCES	
SUBTOTAL	2050
SAFETY FACTOR 5 %	1025
SPACE LATENT HEAT GAINS (SLH)	3075
DUCT LEAKAGE LOSSES	
B.P.F. AIR CFM x GR/LB x bf x 0.68	
EFFECTIVE SPACE LATENT HEAT GAINS (ESLH)	3075
EFFECTIVE SPACE SENS. HEAT GAINS (ESSH)	20338
EFFECTIVE SPACE TOTAL HEAT GAINS (ESTH)	23413

SENSIBLE HEAT FACTOR 20125 (ESSH) / 22485 (ESTH) = 0,9

INDICATED ADP 49 °F, SELECTED ADP 49 °F

DEHUMIDIFIED AIR TEMPERATURE RISE (ΔT) = 24

(1 - bf) x (space 70 °F - ADP 49 °F) = 21 °F

DEHUMIDIFIED AIR VOLUME = 22485 (ESSH) / 1.08 x °F DEH. AIR ΔT = 1070 CFM

OUTLET TEMPERATURE DIFFERENCE (SPACE T - OUTLET AIR T)

(SSH) / 1.08 x CFM DEH. AIR

SUPPLY AIR VOLUME =

(SSH) / 1.08 x °F DESIRED ΔT = CFM

ENTERING AIR: °F DB °F WB LEAVING AIR: °F DB °F WB

FRESH AIR 10 X 15 = 150 CFM

FASH 150 CFM x 20 °F (1 - bf) x 1.08 = 3240

FALH — CFM x GR/LB (1 - bf) x 0.68 =

FA TOTAL HEAT GAINS 3240

EFFECTIVE SPACE TOTAL HEAT GAINS 23413

GRAND TOTAL HEAT GAINS 26685

TONNAGE 26685 / 12,000 = 2 TONS

NOTES:

PROJECT NAME Abu-Jaber

SPACE NUMBER 1 FLOOR Second

AREA 237 SQ FT

VOLUME

LAT. 221 SUN HR 3 MONTH Aug

CONDITION	DB	WB	%RH	GR/LB	BTU/LB
OUTSIDE AIR TEMP	90	68	36%		
SPACE AIR TEMP	70	59	50%		
DIFFERENCE					
OPERATING TIME				HOURS	

SHEET 5 OF 6

PROJECT NO.

DATE

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CEC - AIR CONDITIONING LOAD ESTIMATE SHEET

HEAT GAINS	ITEMS	AREA OR QUANTITY	GAIN ΔT	FACTOR	BTUS/HR
GLASS	W GLASS	48,6	x 70	x 1	3400
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	GLASS		x	x	
	SHD GLASS		x	x	
	SHD GLASS		x	x	
	SKYLIGHT		x	x	
WALLS & ROOFS	W WALL	130	x 16	x 0,25	410
	S WALL	130	x 20,4	x 0,25	520
	WALL		x	x	
	WALL		x	x	
	WALL		x	x	
	SHD WALL		x	x	
	SUN ROOF	237	x 28	x 0,3	1990
	SHD ROOF		x	x	
	EXP FLOOR		x	x	
TRANSMISSION & INFILTRATION	GLASS	48,6	x 20	x 1	1000
	GLASS		x	x	
	GLASS		x	x	
	PARTITION	178	x 15	x 0,2	535
	PARTITION		x	x	
	PARTITION		x	x	
	FLOOR	237	x 15	x 0,1	1065
	CEILING		x	x	
	INFILTRATION CFM		x	x 1.08	
	PEOPLE	5		x 245	1225
	PEOPLE			x	
	POWER		HP OR KW	x	
	LIGHTS	237 x 1,25	x 1W	x 3.4	2900
	APPLIANCES			x	
	SUBTOTAL				12765
	SAFETY FACTOR		15 %		1915
	SPACE SENSIBLE HEAT GAINS (SSH)				14680
	LEAKAGE, DUCT AND FAN GAINS		%		
	B.P.F. AIR CFM x		x bf x 1.08		
	EFFECTIVE SPACE SENSIBLE HEAT GAINS (ESSH)				14680

LATENT HEAT GAINS	ITEMS	BTUS/HR
	INFILTRATION CFM x GR/LB x 0.68	
	PEOPLE 5 x 205	1025
	PEOPLE x	
	STEAM LBS/HR. x 1000	
	APPLIANCES	
	SUBTOTAL	1025
	SAFETY FACTOR .5 %	60
	SPACE LATENT HEAT GAINS (SLH)	
	DUCT LEAKAGE LOSSES	
	B.P.F. AIR CFMx GR/LBx bf 0.68	
	EFFECTIVE SPACE LATENT HEAT GAINS (ESLH)	1025
	EFFECTIVE SPACE SENS. HEAT GAINS (ESH)	14680
	EFFECTIVE SPACE TOTAL HEAT GAINS (EST)	15705

SENSIBLE HEAT FACTOR = 14680 (ESH) / 15705 (EST) = 0,93

INDICATED ADP 50 °F, SELECTED ADP 50 °F

DEHUMIDIFIED AIR TEMPERATURE RISE (ΔT) 20

(1 - bf) x (space 70 °F - ADP 50 °F) 20 °F

DEHUMIDIFIED AIR VOLUME

14680 (ESH) / 1.08 x °F DEH. AIR ΔT 20 = 720 CFM

OUTLET TEMPERATURE DIFFERENCE (SPACE T - OUTLET AIR T)

(SSH) / 1.08 x CFM DEH. AIR

SUPPLY AIR VOLUME

(SSH) / 1.08 x °F DESIRED ΔT CFM

ENTERING AIR: °F DB °F WB LEAVING AIR: °F DB °F WB

FRESH AIR 5 X 15 CFM

FASH 75 CFM x 20 °F (1 - bf) x 1.08 = 1620

FALH — CFM x GR/LB (1 - bf) x 0.68

FA TOTAL HEAT GAINS 1620

EFFECTIVE SPACE TOTAL HEAT GAINS 15705

GRAND TOTAL HEAT GAINS 17325

TONNAGE 17325 / 12000 ≈ 1,5 TONS

NOTES:

PROJECT NAME Abu Jaber

SPACE NUMBER 2 FLOOR Second

AREA 564 Sq.ft.

VOLUME

LAT. 32 SUN HR. 3 MONTH Aug

CONDITION	DB	WB	%RH	GR/LB	BTU/LB
OUTSIDE AIR TEMP	90	68	36%		
SPACE AIR TEMP	70	59	50%		
DIFFERENCE					
OPERATING TIME					HOURS

SHEET 6 OF 6

PROJECT NO.

DATE

COMPUTED BY

CHECKED BY

HEAT GAINS		ITEMS	AREA OR QUANTITY	GAIN Δ T	FACTOR	BTUS/HR
GLASS	N	GLASS	64,8	x 12,8	x 1	850
	W	GLASS	32,4	x 70	x 1	2340
		GLASS		x	x	
		GLASS		x	x	
		GLASS		x	x	
		SHD GLASS		x	x	
		SHD GLASS		x	x	
		SKYLIGHT		x	x	
WALLS & ROOFS	N	WALL	259	x 10,5	x 0,25	540
	W	WALL	180	x 16	x 0,25	420
	S	WALL	162	x 20,4	x 0,25	660
		WALL		x	x	
		WALL		x	x	
		SHD WALL		x	x	
		SUN ROOF	564	x 28	x 0,3	4740
		SHD ROOF		x	x	
		EXP FLOOR		x	x	
TRANSMISSION & INFILTRATION		GLASS	97,2	x 20	x 1	1950
		GLASS		x	x	
		GLASS		x	x	
		PARTITION	178	x 15	x 0,2	535
		PARTITION		x	x	
		PARTITION		x	x	
		FLOOR		x	x	
		CEILING		x	x	
		INFILTRATION	CFM	x	x 1.08	
		PEOPLE	15		x 245	3675
		PEOPLE			x	
		POWER	HP OR KW		x	
		LIGHTS	564 x 1,25	x 3	W x 3.4	7140
		APPLIANCES			x	
		SUBTOTAL				22860
		SAFETY FACTOR		15	%	3430
		SPACE SENSIBLE HEAT GAINS (SSHG)				26290
		LEAKAGE, DUCT AND FAN GAINS			%	
		B.P.F. AIR	CFM x		x bf x 1.08	
		EFFECTIVE SPACE SENSIBLE HEAT GAINS (ESSHG)				26290

LATENT HEAT GAINS / ITEMS	BTUS/HR
INFILTRATION CFM x GR/LB x 0.68	
PEOPLE 15 x 205	3075
PEOPLE x	
STEAM LBS/HR. x 1050	
APPLIANCES	
SUBTOTAL	3075
SAFETY FACTOR %	155
SPACE LATENT HEAT GAINS (SLHG)	3225
DUCT LEAKAGE LOSSES	
B.P.F. AIR CFM x GR/LB x bf 0.68	
EFFECTIVE SPACE LATENT HEAT GAINS (ESLHG)	3225
EFFECTIVE SPACE SENS. HEAT GAINS (ESSHG)	26290
EFFECTIVE SPACE TOTAL HEAT GAINS (ESTHG)	29515

SENSIBLE HEAT FACTOR = 26290 (ESSH) / 29515 (ESTH) = 0,89

INDICATED ADP 49 °F, SELECTED ADP 49 °F

DEHUMIDIFIED AIR TEMPERATURE RISE (ΔT) = 21

(1 − bf) x (space T 70 °F − ADP 49 °F) = 21 °F

DEHUMIDIFIED AIR VOLUME = 29515 (ESTH) / 1.08 x °F DEH. AIR ΔT 21 = 1450 CFM

OUTLET TEMPERATURE DIFFERENCE (SPACE T − OUTLET AIR T) = (SSH) / 1.08 x CFM DEH. AIR

SUPPLY AIR VOLUME = (SSH) / 1.08 x °F DESIRED ΔT CFM

ENTERING AIR: °F DB °F WB LEAVING AIR: °F DB °F WB

FRESH AIR 15 x 15 = 225 CFM

	BTUS/HR
FASH 225 CFM x 20 °F (1− bf) x 1.08	4860
FALH CFM x GR/LB (1− bf) x 0.68	
FA TOTAL HEAT GAINS	4860
EFFECTIVE SPACE TOTAL HEAT GAINS	29515
GRAND TOTAL HEAT GAINS	34375

TONNAGE = 34375 / 12,000 = 3 TONS

CEC - AIR CONDITIONING LOAD ESTIMATE SHEET

NOTES:

لقد وضع وحدتان في الجهة المذكورة أعلاه كل منهما ١,٥ طن تبريد

Two Units of 1.5 Tons each were added.