

CROSSWINDS APARTMENTS HVAC CALCULATIONS

ONE BEDROOM UNIT 1A:
 Project Crosswinds Apartments Unit 1A - One Bedroom HVAC Calculations
 Thu Dec 3 11:07:09 EST 2009

Buh Gain for 26.66 SqFt of Double Pane Glass = 2992.6
 Buh Gain for 21.09 SqFt of Windows in Doors = 278.386

Buh Gain for 261.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 600.3
 Buh Gain for 274.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 631.35
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 693.45
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 693.45

Buh Gain for 921.5 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 3664
 Buh Gain for 2 People = 20
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 180
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 13894.536
 Total Tons of HVAC needed = 1.658 or 2 Tons

ONE BEDROOM UNIT 1A-HC:

Project Crosswinds Apartments Unit 1A-HC - One Bedroom Handicap HVAC Calculations
 Thu Dec 3 11:10:07 EST 2009

Buh Gain for 26.66 SqFt of Double Pane Glass = 2992.6
 Buh Gain for 21.09 SqFt of Windows in Doors = 278.386

Buh Gain for 261.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 600.3
 Buh Gain for 274.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 631.35
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 693.45
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 693.45

Buh Gain for 921.5 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 3664
 Buh Gain for 2 People = 20
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 180
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 13894.536
 Total Tons of HVAC needed = 1.658 or 2 Tons

ONE BEDROOM UNIT 1B:

Project Crosswinds Apartments Unit 1B - One Bedroom HVAC Calculations
 Thu Dec 3 11:12:01 EST 2009

Buh Gain for 89.9 SqFt of Double Pane Glass = 9669

Buh Gain for 274.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 631.35
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 693.45
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 693.45
 Buh Gain for 292.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 672.75

Buh Gain for 968 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 3872
 Buh Gain for 2 People = 20
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 180
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 20995.3
 Total Tons of HVAC needed = 1.746 or 2 Tons

APARTMENTS HEAT PUMP SCHEDULE

NO.	BTU	CFM	O.A.	HEAT ELEC.	VOLTAGE	MECA	CRK BRKR	COMMENTS
1	24,000	800	172	5 KW	208V, 1Ø	-	K-1.3	1 BEDROOM UNITS
2	20,120	1000	247	7 1/2 KW	208V, 1Ø	-	DG-1.3	2 BEDROOM UNITS
3	36,000	1200	274	7 1/2 KW	208V, 1Ø	-	FR-1.3	3 BEDROOM UNITS

LEASING OFFICE/CLUBHOUSE HEAT PUMP SCHEDULE

NO.	TOTAL	CFM	O.A.	HEAT ELEC.	VOLTAGE	MECA	CRK BRKR	COMMENTS
1	24,000	800	177	5 KW	208V, 1Ø	-	K-1.3	ZONE 4 (UPSTAIRS)
2	36,000	1200	235	7 1/2 KW	208V, 1Ø	-	J-1.3	ZONE 5 (UPSTAIRS)
3	48,000	1500	416	1.5 KW	208V, 1Ø	-	FR-1.3	ZONE 2 (KITCHEN)
4	60,000	2000	669	80 KW	208V, 1Ø	-	FR-9.1.1	ZONE 3 (KITCHENSZ)
5	60,000	2000	117	80 KW	208V, 1Ø	-	FR-2.4	ZONE 1 (LEASING)

NOTES:
 ** 20 KW HEAT UNIT COMPOSED OF 2 FA, 10 KW HEATER ELEMENTS,
 ** CONTRACTOR SHALL ASSURE AN INSTAL CORRECT SIZE ELECTRICAL EQUIPMENT
 AND WIRING TO MEET REQUIREMENTS OF EQUIPMENT PURCHASED.

HVAC NOTES

1. CONCEALED DUCTWORK TO BE UN-181, GLASS 1, FIBERGLASS DUCTBOARD. DUCTS SHALL BE SIZED TO LIMIT VMAIN DUCTS TO 1000 CFM & SECONDARY DUCTS TO 800 CFM TO BE INSTALLED PER SMACNA STANDARDS.
2. EXPOSED DUCTWORK TO BE GALVANIZED SHEET METAL PER SMACNA STANDARDS. LINE WITH ROUND FLEXIBLE DUCT TO BE UN-181, CLASS 1, AIR DUCT MATERIALS.
3. DUCT SIZES SHOW ARE CLEAR INSIDE DIMENSIONS.
4. IN ALL SYSTEMS OVER 2000 CFM AND LESS THAN 15,000 CFM, SMOKE DETECTORS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72E IN THE RETURN AIR DUCT DOWNSTREAM OF THE AIR HANDLING UNIT AND ALL FILTERS TO AUTOMATICALLY STOP THE FAN.
5. PROVIDE U.L. LISTED 125 FRESH AIR IN RETURN AIR OR EACH SYSTEM UNDER 2000 CFM
6. TO SHUT DOWN THE FAN IN THE EVENT OF FIRE.
7. FRESH AIR SHALL BE DAMPER CONTROLLED AT ALL DUCT PENETRATIONS OF FIRE RATED WALLS. THE DAMPER SHALL BE REVERSED AT ALL DUCTS OUTSIDE AIR INTAKES.
8. CONDENSATE DRAINS TO BE PVC PIPE RUN TO PLUMBERS' TRAP WITHIN FIVE FEET OF AIR HANDLING UNITS.
9. ALL AIR HANDLING SYSTEMS TO BE BALANCED TO ASSURE PROPER AIR FLOWS PER PLANS.
10. ALL THERMOSTATS TO BE AUTOMATIC CHANGEOVER WITH HEAT SWITCH.

CROSSWINDS APARTMENTS HVAC CALCULATIONS

TWO BEDROOM UNIT 2A:
 Project Crosswinds Apartments Unit 2A - Two Bedroom HVAC Calculations
 Thu Dec 3 12:34:34 EST 2009

Buh Gain for 56.634 SqFt of Double Pane Glass = 6229.74
 Buh Gain for 21.09 SqFt of Windows in Doors = 278.386

Buh Gain for 382.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 879.75
 Buh Gain for 382.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 879.75
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 693.45
 Buh Gain for 292.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 672.75

Buh Gain for 1324 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 5296
 Buh Gain for 3 People = 30
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 245
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 20539.828
 Total Tons of HVAC needed = 2.312 or 2 1/2 Tons

TWO BEDROOM UNIT 2A-HC:

Project Crosswinds Apartments Unit 2A-HC - Two Bedroom Handicap HVAC Calculations
 Thu Dec 3 12:34:34 EST 2009

Buh Gain for 56.634 SqFt of Double Pane Glass = 6229.74
 Buh Gain for 21.09 SqFt of Windows in Doors = 278.386

Buh Gain for 382.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 879.75
 Buh Gain for 382.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 879.75
 Buh Gain for 301.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 693.45
 Buh Gain for 292.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 672.75

Buh Gain for 1324 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 5296
 Buh Gain for 3 People = 30
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 245
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 20539.828
 Total Tons of HVAC needed = 2.312 or 2 1/2 Tons

APARTMENTS FRESH AIR REQUIREMENTS PER IMC 2006, TABLE 403.3

APARTMENT / ROOM SIZE & NUMBER	ROOM / DESC.	SQ. FT.	OCCUPANTS	CFM O.A. / OCC.	TOTAL REQ. O.A. (CFM)
1 BEDROOM UNIT 1A	LIVING AREAS	745	2	15	30
	KITCHEN	107	1	100	100
	BATHROOM	69	1	50cfm / W.C.	50
	OVERALL	921	2		180
1 BEDROOM UNIT 1A-HC	LIVING AREAS	737	2	15	30
	KITCHEN	107	1	100	100
	BATHROOM	77	1	50cfm / W.C.	50
	OVERALL	921	2		180
1 BEDROOM UNIT 1B	LIVING AREAS	745	2	15	30
	KITCHEN	115	1	100	100
	BATHROOM	108	1	50cfm / W.C.	50
	OVERALL	968	2		180
2 BEDROOM UNIT 2A	LIVING AREAS	1,033	3	15	45
	KITCHEN	99	1	100	100
	BATHROOMS (2)	192	2	50cfm / W.C.	100
	OVERALL	1,324	3		245
2 BEDROOM UNIT 2A-HC	LIVING AREAS	1,037	3	15	45
	KITCHEN	99	1	100	100
	BATHROOMS (2)	188	2	50cfm / W.C.	100
	OVERALL	1,324	3		245
3 BEDROOM UNIT 3A	LIVING AREAS	1,231	4	15	60
	KITCHEN	110	1	100	100
	BATHROOMS (2)	141	2	50cfm / W.C.	100
	OVERALL	1,482	4		260
3 BEDROOM UNIT 3A-HC	LIVING AREAS	1,223	4	15	60
	KITCHEN	110	1	100	100
	BATHROOMS (2)	149	2	50cfm / W.C.	100
	OVERALL	1,482	4		260

CROSSWINDS APARTMENTS HVAC CALCULATIONS

THREE BEDROOM UNIT 3A:
 Project Crosswinds Apartments Unit 3A - Three Bedroom HVAC Calculations
 Thu Dec 3 12:56:33 EST 2009

Buh Gain for 69.96 SqFt of Double Pane Glass = 7695.6
 Buh Gain for 21.09 SqFt of Windows in Doors = 278.386

Buh Gain for 466 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 1076.4
 Buh Gain for 466 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 1076.4
 Buh Gain for 311.25 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 715.875
 Buh Gain for 311.25 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 715.875

Buh Gain for 1492 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 5928
 Buh Gain for 4 People = 40
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 260
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 23590.536
 Total Tons of HVAC needed = 2.966 or 3 Tons

THREE BEDROOM UNIT 3A-HC:

Project Crosswinds Apartments Unit 3A-HC - Three Bedroom Handicap HVAC Calculations
 Thu Dec 3 12:56:33 EST 2009

Buh Gain for 69.96 SqFt of Double Pane Glass = 7695.6
 Buh Gain for 21.09 SqFt of Windows in Doors = 278.386

Buh Gain for 466 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 1076.4
 Buh Gain for 466 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 1076.4
 Buh Gain for 311.25 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 715.875
 Buh Gain for 311.25 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 715.875

Buh Gain for 1492 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 5928
 Buh Gain for 4 People = 40
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 260
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 23590.536
 Total Tons of HVAC needed = 2.966 or 3 Tons

LEASING BLDG./CLUBHOUSE FRESH AIR REQUIREMENTS PER IMC 2006, TABLE 403.3

ROOM/AREA DESCRIPTION	SQ. FT.	OCCUPANTS	CFM O.A. / OCC.	TOTAL REQ. O.A. (CFM)
1 BDR. APARTMENT - ZONE 4	647	2	15	30
LIVING AREAS	131	1	100	100
BATHROOM	65	1	50cfm / W.C.	50
HALLWAY	89	1	0.06 cfm / sq ft	5.3
STAIR CORRIDOR	82	1	0.06 cfm / sq ft	5.3
OVERALL	971	2		188
2 BDR. APARTMENT - ZONE 5	1,179	3	15	45
LIVING AREAS	147	1	100	100
BATHROOMS (2)	151	2	50cfm / W.C.	100
OVERALL	1,477	3		245
KITCHEN/RECREATION - ZONE 2	630	13	10	130
RECREATION AREA	159	1	100	100
KITCHEN	171	1	0.06 cfm / sq ft	10
HALLWAY	70	1	5	25
WANTENANCE	99	1	25	25
MEDIA ROOM	76	1	75cfm / W.C.	75
WOMENS RESTROOM	76	1	75cfm / W.C.	75
OVERALL	1,285	15		420
EXCESS/STORAGE - ZONE 3	1,076	22	10	220
EXCESS/STORAGE ROOM	67	1	0.06 cfm / sq ft	4
HALLWAY	79	1	5	23
VEHICLE/RISER	1,222	22		229
OVERALL	HP-5 = 5 TON			1191
LEASING OFFICE - ZONE 1	168	1	5	5
MANAGERS OFFICE	161	1	5	5
ASSISTANT MANAGER	207	6	30	30
RECEPTION AREA	413	13	5	65
LEASE AREA	110	1	0.06 cfm / sq ft	5
COPY/FILE ROOM	70	1	0.06 cfm / sq ft	4.2
HALLWAY	79	1	5	23
STAIR CORRIDOR	1,228	22		119

CROSSWINDS APARTMENTS HVAC CALCULATIONS

LEASING BLDG./CLUBHOUSE-FIRST FLOOR - ZONE 1 (Lease Office):
 Project Crosswinds Apartments Lease Office/Club House-Zone 1 HVAC Calculations
 Thu Dec 3 15:31:23 EST 2009

Buh Gain for 28.43 SqFt of North Double Pane Glass = 852.9
 Buh Gain for 26.3 SqFt of East and West Double Pane Glass = 2893
 Buh Gain for 26.3 SqFt of South Double Pane Glass = 2104
 Buh Gain for 66.15 SqFt of Windows in Doors = 873.18

Buh Gain for 324 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 745.2
 Buh Gain for 342 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 786.6
 Buh Gain for 252 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 579.6
 Buh Gain for 252 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 579.6

Buh Gain for 1228 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 4912
 Buh Gain for 22 People = 220
 Buh Gain for 1228 SqFt of Area Lighting in an Office = 5684

Total Outside Fresh Air CFM = 119
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 18427.08
 Total Tons of HVAC needed = 4.536 or 5 Tons

LEASING BLDG./CLUBHOUSE-FIRST FLOOR - ZONE 2 (Recreation):

Project Crosswinds Apartments Lease Office/Club House-Zone 2 HVAC Calculations
 Thu Dec 3 15:47:54 EST 2009

Buh Gain for 28.43 SqFt of North Double Pane Glass = 852.9
 Buh Gain for 39.45 SqFt of South Double Pane Glass = 3156
 Buh Gain for 18.9 SqFt of Windows in Doors = 249.48

Buh Gain for 448.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 1031.55
 Buh Gain for 260.25 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 596.575
 Buh Gain for 463.79 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 1112.625
 Buh Gain for 216 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 496.8

Buh Gain for 1285 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 5140
 Buh Gain for 22 People = 220
 Buh Gain for 1285 SqFt of Area Lighting in a Recreational Facility = 3955

Total Outside Fresh Air CFM = 420
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 16652.93
 Total Tons of HVAC needed = 3.306 or 4 Tons

LEASING BLDG./CLUBHOUSE-FIRST FLOOR - ZONE 3 (Exercise Room):

Project Crosswinds Apartments Lease Office/Club House-Zone 3 HVAC Calculations
 Thu Dec 3 16:01:00 EST 2009

Buh Gain for 79.08 SqFt of North Double Pane Glass = 2372.4
 Buh Gain for 105.44 SqFt of East and West Double Pane Glass = 11598.4
 Buh Gain for 105.45 SqFt of Windows in Doors = 574.22

Buh Gain for 343.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 790.05
 Buh Gain for 288 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 662.4
 Buh Gain for 343.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 790.05
 Buh Gain for 288 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 662.4

Buh Gain for 1228 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 4888
 Buh Gain for 22 People = 220
 Buh Gain for 1228 SqFt of Area Lighting in an Exercise Facility = 3666

Total Outside Fresh Air CFM = 229
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 26023.92
 Total Tons of HVAC needed = 4.569 or 5 Tons

LEASING BLDG./CLUBHOUSE-SECOND FLOOR - ZONE 4 (1 Bdr. Apartment):

Project Crosswinds Apartments Lease Office/Club House-Zone 4 HVAC Calculations
 Thu Dec 3 16:12:27 EST 2009

Buh Gain for 41.58 SqFt of East and West Double Pane Glass = 4573.8
 Buh Gain for 39.45 SqFt of South Double Pane Glass = 3156
 Buh Gain for 9.45 SqFt of Windows in Doors = 124.74

Buh Gain for 337.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 776.25
 Buh Gain for 204 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 469.2
 Buh Gain for 247.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 569.25
 Buh Gain for 357.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 776.25

Buh Gain for 971.5 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 3884
 Buh Gain for 2 People = 20
 Buh Gain for 971.5 SqFt of Area Lighting in an Apartment = 2913
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 186
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 18660.49
 Total Tons of HVAC needed = 1.572 or 2 Tons

LEASING BLDG./CLUBHOUSE-SECOND FLOOR - ZONE 5 (2 Bdr. Apartment):

Project Crosswinds Apartments Lease Office/Club House-Zone 5 HVAC Calculations
 Thu Dec 3 16:18:29 EST 2009

Buh Gain for 87.7 SqFt of North Double Pane Glass = 261
 Buh Gain for 39.45 SqFt of South Double Pane Glass = 3156
 Buh Gain for 9.45 SqFt of Windows in Doors = 124.74

Buh Gain for 480 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 1 = 1104
 Buh Gain for 337.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 2 = 776.25
 Buh Gain for 523.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 3 = 1204.05
 Buh Gain for 211.5 SqFt of Wood R-13 & 5/8" Gypsum Wall Number 4 = 486.45

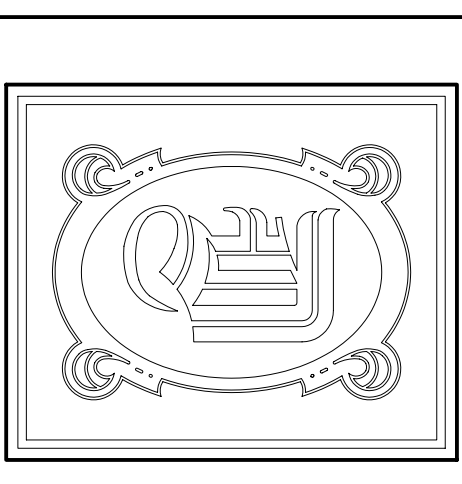
Buh Gain for 1477 SqFt of Ceiling and Roof Combo R-30; Ceiling Number 1 = 5908
 Buh Gain for 2 People = 20
 Buh Gain for 1477 SqFt of Area Lighting in an Apartment = 4431
 Wattage for 1 Coffee Machine = 470

Total Outside Fresh Air CFM = 245
 This is in accordance with International Mechanical Code 2006

Total BTU/h Gain = 19079.49
 Total Tons of HVAC needed = 2.589 or 3 Tons

EXHAUST FAN SCHEDULE

LOC	CFM	VOLTAGE	TYPE	MANUFACTURER
TOILETS	100	120	VENTILIGHT	BROAD NUTONE OR PANASONIC



DAMMON ENGINEERING, INC.

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