

*Krasnoyarsk  
HVAC Load Calculations*

for

KRASVZRIVPROM



**RHVAC** RESIDENTIAL  
HVAC LOADS

Prepared By:

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HVAC SPB

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6 Апрель 2010 г.



**Project Report**

**General Project Information**

Project Title: Krasnoyarsk  
 Designed By: Vladimir  
 Project Date: 12.14.2008  
 Client Name: KRASVZRIVPROM  
 Company Name: HVAC SPB  
 Company Representative: Vladimir  
 Company Phone: 8(812)954-17-67  
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 Company Comment:

**Design Data**

Reference City: Krasnoyarsk, \_Russia  
 Daily Temperature Range: Medium  
 Latitude: 56 Degrees  
 Elevation: 908 ft.  
 Altitude Factor: 0,968  
 Elevation Sensible Adj. Factor: 1,000  
 Elevation Total Adj. Factor: 1,000  
 Elevation Heating Adj. Factor: 1,000  
 Elevation Heating Adj. Factor: 1,000

	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	-45	0	30	72	36
Summer:	95	63	50	75	-29

**Check Figures**

Total Building Supply CFM:	2 000	CFM Per Square ft.:	0,635
Square ft. of Room Area:	3 152	Square ft. Per Ton:	1 100
Volume (ft?) of Cond. Space:	31 033		

**Building Loads**

Total Heating Required Including Ventilation Air:	110 531 Btuh	110,531 MBH
Total Sensible Gain:	25 782 Btuh	128 %
Total Latent Gain:	-5 635 Btuh	-28 %
Total Cooling Required Including Ventilation Air:	20 147 Btuh	1,68 Tons (Based On Sensible + Latent)
		2,86 Tons (Based On 75% Sensible Capacity)

**Notes**

Calculations are based on 8th edition of ACCA Manual J.  
 All computed results are estimates as building use and weather may vary.  
 Be sure to select a unit that meets both sensible and latent loads.



**Load Preview Report**

Scope	Has AED	Net Ton	Rec Ton	ft.? /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Min Htg CFM	Min Clg CFM	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building		1,68	2,86	1 100	3 152	25 782	-5 635	20 147	110 531	1 320	1 113	1 700	2 000	2 000	
System 1	Yes	1,68	2,86	1 100	3 152	25 782	-5 635	20 147	110 531	1 320	1 113	1 700	2 000	2 000	18x18
Ventilation						2 086	-1 876	211	12 204						
Duct Latent							-2 175	-2 175							
Humidification									6 184						
Zone 1					1 388	20 714	-580	20 134	38 510	552	973	710	1 037	1 037	12x15
6-Bedroom 1					180	3 787	-130	3 657	7 455	107	178	138	190	190	2-6
10-Kitchen					141	3 019	-130	2 889	7 504	107	142	138	151	151	1-7
11-Living Room					538	9 939	-173	9 766	14 134	202	467	261	498	498	5-6
16-Living					331	3 652	-147	3 505	8 268	118	172	153	183	183	2-6
17-Recreation Room					198	317	0	317	1 149	16	15	21	16	16	1-4
Zone 2					363	9 781	-173	9 608	14 846	213	459	274	490	490	9x12
2-Game Room					363	9 781	-173	9 608	14 846	213	459	274	490	490	4-7
Zone 3					1 401	9 436	-831	8 605	38 787	556	443	716	473	473	8x12
1-Storage					144	3 286	-131	3 155	6 812	98	154	126	165	165	1-8
3-Basement					144	582	-131	451	4 865	70	27	90	29	29	1-4
4-Laundry					216	227	-71	156	2 648	38	11	49	11	11	1-4
5-Laundry					234	239	-75	164	2 802	40	11	52	12	12	1-4
7-Storage Room					105	422	-62	360	2 613	37	20	48	21	21	1-4
8-Bath 1					98	500	-31	469	2 287	33	23	42	25	25	1-4
9-Entry					45	329	-52	277	2 162	31	15	40	16	16	1-4
12-Bedroom 2					130	1 014	-71	943	4 852	69	48	90	51	51	1-4
13-Bath 2					60	231	-43	188	1 615	23	11	30	12	12	1-4
14-Bedroom 3					115	822	-83	739	4 103	59	39	76	41	41	1-4
15-Hall					110	1 786	-81	1 705	4 028	58	84	74	89	89	1-6
Sum of room airflows may be greater than system airflow because system has multiple zones.															



**Total Building Summary Loads**

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
1E-cw: Glazing-Double pane window, fixed sash, clear, wood frame, outdoor insect screen with 100% coverage, light color drapes with medium weave with 50% coverage, u-value 0,56, SHGC 0,66	530,8	34 778	0	16 706	16 706
11P: Door-Metal - Polyurethane Core	59	2 004	0	531	531
14B1-6.5s: Wall-structural insulated panel (SIP), R -3.85 per inch EPS core, stucco or wood siding, interior finish, 6.5 inch R-23.04 SIP panels	3455	19 000	0	2 760	2 760
17A1-6: Roof/Ceiling-Roof Deck (roofing, wood, insulation) or SIP Panels Supported on Beams, Structural Insulated Panels (SIPs), R -3.85 per Inch EPS Core, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, 6.5 inch R-23.04 SIP panels	944,7	4 974	0	1 488	1 488
21B-20: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, R-3 or higher insulation installed below floor, any floor cover, shortest side of floor slab is 20' wide	1100,5	2 446	0	0	0
Subtotals for structure:		63 202	0	21 485	21 485
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		8 329	-2 175	450	-1 725
Infiltration: Winter CFM: 166, Summer CFM: 83		20 612	-1 584	1 760	176
Ventilation: Winter CFM: 98, Summer CFM: 98		12 204	-1 876	2 086	211
Humidification (Winter) 16,86 gal/day :		6 184	0	0	0
<b>Total Building Load Totals:</b>		<b>110 531</b>	<b>-5 635</b>	<b>25 782</b>	<b>20 147</b>

**Check Figures**

Total Building Supply CFM:	2 000	CFM Per Square ft.:	0,635
Square ft. of Room Area:	3 152	Square ft. Per Ton:	1 100
Volume (ft?) of Cond. Space:	31 033		

**Building Loads**

Total Heating Required Including Ventilation Air:	110 531 Btuh	110,531 MBH
Total Sensible Gain:	25 782 Btuh	128 %
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Total Cooling Required Including Ventilation Air:	20 147 Btuh	1,68 Tons (Based On Sensible + Latent)
		2,86 Tons (Based On 75% Sensible Capacity)

**Notes**

Calculations are based on 8th edition of ACCA Manual J.  
All computed results are estimates as building use and weather may vary.  
Be sure to select a unit that meets both sensible and latent loads.



### System 1 Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
1E-cw: Glazing-Double pane window, fixed sash, clear, wood frame, outdoor insect screen with 100% coverage, light color drapes with medium weave with 50% coverage, u-value 0,56, SHGC 0,66	530,8	34 778	0	16 706	16 706
11P: Door-Metal - Polyurethane Core	59	2 004	0	531	531
14B1-6.5s: Wall-structural insulated panel (SIP), R -3.85 per inch EPS core, stucco or wood siding, interior finish, 6.5 inch R-23.04 SIP panels	3455	19 000	0	2 760	2 760
17A1-6: Roof/Ceiling-Roof Deck (roofing, wood, insulation) or SIP Panels Supported on Beams, Structural Insulated Panels (SIPs), R -3.85 per Inch EPS Core, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, 6.5 inch R-23.04 SIP panels	944,7	4 974	0	1 488	1 488
21B-20: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, R-3 or higher insulation installed below floor, any floor cover, shortest side of floor slab is 20' wide	1100,5	2 446	0	0	0
Subtotals for structure:		63 202	0	21 485	21 485
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		8 329	-2 175	450	-1 725
Infiltration: Winter CFM: 166, Summer CFM: 83		20 612	-1 584	1 760	176
Ventilation: Winter CFM: 98, Summer CFM: 98		12 204	-1 876	2 086	211
Humidification (Winter) 16,86 gal/day :		6 184	0	0	0
System 1 Load Totals:		110 531	-5 635	25 782	20 147

#### Check Figures

Supply CFM:	2 000	CFM Per Square ft.:	0,635
Square ft. of Room Area:	3 152	Square ft. Per Ton:	1 100
Volume (ft?) of Cond. Space:	31 033		

#### System Loads

Total Heating Required Including Ventilation Air:	110 531 Btuh	110,531 MBH
Total Sensible Gain:	25 782 Btuh	128 %
Total Latent Gain:	-5 635 Btuh	-28 %
Total Cooling Required Including Ventilation Air:	20 147 Btuh	1,68 Tons (Based On Sensible + Latent)
		2,86 Tons (Based On 75% Sensible Capacity)

#### Notes

Calculations are based on 8th edition of ACCA Manual J.  
All computed results are estimates as building use and weather may vary.  
Be sure to select a unit that meets both sensible and latent loads.



**System 1, Zone 1 Summary Loads (Peak Load Procedure for Rooms)**

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
1E-cw: Glazing-Double pane window, fixed sash, clear, wood frame, outdoor insect screen with 100% coverage, light color drapes with medium weave with 50% coverage, u-value 0,56, SHGC 0,66	275,9	18 077	0	9 146	9 146
14B1-6.5s: Wall-structural insulated panel (SIP), R -3.85 per inch EPS core, stucco or wood siding, interior finish, 6.5 inch R-23.04 SIP panels	1204,4	6 623	0	963	963
17A1-6: Roof/Ceiling-Roof Deck (roofing, wood, insulation) or SIP Panels Supported on Beams, Structural Insulated Panels (SIPs), R -3.85 per Inch EPS Core, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, 6.5 inch R-23.04 SIP panels	529,1	2 786	0	834	834
Subtotals for structure:		27 486	0	19 835	19 835
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		3 481	0	234	234
Infiltration: Winter CFM: 61, Summer CFM: 30		7 543	-580	645	65
System 1, Zone 1 Load Totals:		38 510	-580	20 714	20 134

**Check Figures**

Supply CFM:	1 037	CFM Per Square ft.:	0,747
Square ft. of Room Area:	1 388	Square ft. Per Ton:	752
Volume (ft?) of Cond. Space:	13 666		

**Zone Loads**

Total Heating Required:	38 510 Btuh	38,510 MBH
Total Sensible Gain:	20 714 Btuh	103 %
Total Latent Gain:	-580 Btuh	-3 %
Total Cooling Required:	20 134 Btuh	1,68 Tons (Based On Sensible + Latent)
		1,85 Tons (Based On 75% Sensible Capacity)

**Notes**

Calculations are based on 8th edition of ACCA Manual J.  
All computed results are estimates as building use and weather may vary.  
Be sure to select a unit that meets both sensible and latent loads.



**System 1, Zone 2 Summary Loads (Peak Load Procedure for Rooms)**

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
1E-cw: Glazing-Double pane window, fixed sash, clear, wood frame, outdoor insect screen with 100% coverage, light color drapes with medium weave with 50% coverage, u-value 0,56, SHGC 0,66	133,7	8 759	0	4 303	4 303
14B1-6.5s: Wall-structural insulated panel (SIP), R -3.85 per inch EPS core, stucco or wood siding, interior finish, 6.5 inch R-23.04 SIP panels	307,5	1 691	0	246	246
21B-20: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, R-3 or higher insulation installed below floor, any floor cover, shortest side of floor slab is 20' wide	362,5	806	0	0	0
Subtotals for structure:		11 256	0	9 479	9 479
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		1 342	0	110	110
Infiltration: Winter CFM: 18, Summer CFM: 9		2 248	-173	192	19
System 1, Zone 2 Load Totals:		14 846	-173	9 781	9 608

**Check Figures**

Supply CFM:	490	CFM Per Square ft.:	1,350
Square ft. of Room Area:	363	Square ft. Per Ton:	427
Volume (ft?) of Cond. Space:	3 568		

**Zone Loads**

Total Heating Required:	14 846 Btuh	14,846 MBH
Total Sensible Gain:	9 781 Btuh	102 %
Total Latent Gain:	-173 Btuh	-2 %
Total Cooling Required:	9 608 Btuh	0,80 Tons (Based On Sensible + Latent)
		0,85 Tons (Based On 75% Sensible Capacity)

**Notes**

Calculations are based on 8th edition of ACCA Manual J.  
All computed results are estimates as building use and weather may vary.  
Be sure to select a unit that meets both sensible and latent loads.



**System 1, Zone 3 Summary Loads (Peak Load Procedure for Rooms)**

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
1E-cw: Glazing-Double pane window, fixed sash, clear, wood frame, outdoor insect screen with 100% coverage, light color drapes with medium weave with 50% coverage, u-value 0,56, SHGC 0,66	121,2	7 942	0	3 257	3 257
11P: Door-Metal - Polyurethane Core	59	2 004	0	531	531
14B1-6.5s: Wall-structural insulated panel (SIP), R -3.85 per inch EPS core, stucco or wood siding, interior finish, 6.5 inch R-23.04 SIP panels	1943,2	10 686	0	1 551	1 551
17A1-6: Roof/Ceiling-Roof Deck (roofing, wood, insulation) or SIP Panels Supported on Beams, Structural Insulated Panels (SIPs), R -3.85 per Inch EPS Core, Dark or Bold-Color Asphalt Shingle, Dark Metal, Dark Membrane, Dark Tar and Gravel, 6.5 inch R-23.04 SIP panels	415,6	2 188	0	654	654
21B-20: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, R-3 or higher insulation installed below floor, any floor cover, shortest side of floor slab is 20' wide	738	1 640	0	0	0
Subtotals for structure:		24 460	0	8 407	8 407
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		3 506	0	106	106
Infiltration: Winter CFM: 87, Summer CFM: 43		10 821	-831	923	92
System 1, Zone 3 Load Totals:		38 787	-831	9 436	8 605

**Check Figures**

Supply CFM:	473	CFM Per Square ft.:	0,337
Square ft. of Room Area:	1 401	Square ft. Per Ton:	1 462
Volume (ft?) of Cond. Space:	13 799		

**Zone Loads**

Total Heating Required:	38 787 Btuh	38,787 MBH
Total Sensible Gain:	9 436 Btuh	110 %
Total Latent Gain:	-831 Btuh	-10 %
Total Cooling Required:	8 605 Btuh	0,72 Tons (Based On Sensible + Latent)
		0,96 Tons (Based On 75% Sensible Capacity)

**Notes**

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All computed results are estimates as building use and weather may vary.  
Be sure to select a unit that meets both sensible and latent loads.