

Title 24 Heater Sizing Calculation

October 31, 1994

Designer: Thomas Rahe
705 Skyward Dr
Aptos, CA 95003

RE: Minden / Ponzini Residence

The following method of calculation may be used for natural gas and LP furnace sizing:

Heat Loss: q

$$q = (OHTM) \times \text{Floor Area} \times \text{Delta T} - (\text{Floor Area} \times \text{Delta T}) / 36$$

Furnace Sizing:

$$1.3 \times q + (10 \text{ btu/hr/sf} \times \text{Floor area})$$

$$q = 0.722 \times 3,097 \times 36 - (36 \times 3,097) / 36 = 81,872.292$$

$$1.3 \times 81,872.29 + (10 \times 3,097) = 137,403.9796$$

Furnace Size

Please use this information only as a reference.

| | | | | | |
|---|--------------------------|--|--|-------------------|-------------------------|
| CERTIFICATE OF COMPLIANCE: RESIDENTIAL | | Page 1 | CF-1R | | |
| Project Title..... Minden/Ponzini Residence | | Date..... 10/31/94 | | | |
| Project Address..... Senda Ladera Lane Watsonville, CA | | Building Permit # Plan check / Date Field check / Date | | | |
| Documentation Author... P.J. Van Guilder | | | | | |
| Company..... T D R (Energy Section) Telephone..... 408-728-7717 | | | | | |
| Compliance Method..... MICROPAS4 by Enerco, Inc. | | | | | |
| Climate Zone..... 03 | | | | | |
| MICROPAS4 v4.02 File-MINDEN Wth-CTE03S92 Program-FORM CF-1R User#-MP1508 User-T D R (Energy Section) Run-Residence | | | | | |
| GENERAL INFORMATION | | | | | |
| Conditioned Floor Area..... | 1097 sf | | | | |
| Building Type..... | Single Family Detached | | | | |
| Construction Type..... | New | | | | |
| Building Front Orientation..... | Front Facing 65 deg (NE) | | | | |
| Number of Dwelling Units..... | 1 | | | | |
| Number of Stories..... | 2 | | | | |
| Floor Construction Type..... | Raised Floor (Package E) | | | | |
| BUILDING SHELL INSULATION | | | | | |
| Component Type | Insulation R-value | Assembly U-Value | Location/Comments | | |
| Wall | R-19 | 0.063 | 2X6 Stud Wall | | |
| Roof | R-30 | 0.036 | Attic | | |
| Roof | R-30 | 0.036 | Vault | | |
| Floor | R-19 | 0.037 | To Crawlspace | | |
| Door | R-0 | 0.330 | Door | | |
| FENESTRATION | | | | | |
| Orientation | Area (sf) | U-Value | # of Interior Pan- Shading/ es Description | Exterior Shading | Over-hang/ Framing Type |
| Window Front (NE) | 178.0 | 0.470 | 2 Drapes.Std | None | None Wood |
| Window Left (SE) | 93.5 | 0.470 | 2 Drapes.Std | None | None Wood |
| Window Back (SW) | 302.5 | 0.470 | 2 Drapes.Std | None | None Wood |
| Window Right (NW) | 197.0 | 0.470 | 2 Drapes.Std | None | None Wood |
| Skylight Horiz | 18.0 | 0.750 | 2 None | None | None Metal |
| THERMAL MASS | | | | | |
| Type | Exposed | Area (sf) | Thickness (in) | Location/Comments | |
| InteriorVert | Yes | 54 | 1.0 | fireplace | |
| InteriorHorz | Yes | 36 | 1.0 | fireplace | |
| InteriorHorz | Yes | 1233 | 1.0 | Tile Floor | |

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Building Permit #
 Plan Check / Date
 Field Check/ Date

Compliance Method..... MICROPAS4 by Enercomp, Inc.
 Climate Zone..... 03

MICROPAS4 v4.02 File-MINDEN Wth-CT203S92 Program-FORM C-2R
 User#-MP1508 User-T D R (Energy Section) Run-Residence

MICROPAS4 ENERGY USE SUMMARY

| Energy Use (kBtu/sf-yr) | Standard Design | Proposed Design | Compliance Margin |
|----------------------------|--------------------|--------------------|----------------------|
| Space Heating..... | 9.62 | 5.19 | 4.43 |
| Space Cooling..... | 2.92 | 2.41 | 0.51 |
| Water Heating..... | 8.44 | 7.33 | 1.11 |
| Total | 20.98 | 14.93 | 6.05 |

*** Building complies with Computer Performance ***

GENERAL INFORMATION

Conditioned Floor Area..... 3097 sf
 Building Type..... Single Family Detached
 Construction Type..... New
 Building Front Orientation..... Front Facing 65 deg (NE)
 Number of Dwelling Units... 1
 Number of Building Stories... 2
 Weather Data Type..... ReducedYear
 Floor Construction Type.... Raised Floor (Package E)
 Number of Building Zones... 1
 Conditioned Volume..... 30350 cf
 Footprint Area..... 1953 sf
 Ground Floor Area..... 1953 sf
 Slab-On-Grade Area..... 0 sf
 Glazing Percentage..... 25.5 % of FA
 Average Ceiling Height..... 9.8 ft

BUILDING ZONE INFORMATION

| Zone Type | Floor Area (sf) | Volume (cf) | # of Dwell Units | Cond- itioned | Thermostat Type | Vent Height (ft) | Special Vent Area (sf) |
|--------------------|-----------------------|----------------|------------------------|------------------|--------------------|------------------------|------------------------------|
| HOUSE Residence | 3097 | 30350 | 1.00 | Yes | Setback | 8.0 | n/a |

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 Climate Zone..... 03

MICROPAS4 v4.02 File-MINDEN Wth-CT203S92 Program-HVAC SIZING
 User#-MP1508 User-T D R (Energy Section) Run-Residence

GENERAL INFORMATION

Floor Area..... 3097 sf
 Volume..... 30350 cf
 Front Orientation..... Front Facing 65 deg (NE)
 Sizing Location..... WATSONVILLE
 Latitude..... 36.9 degrees
 Winter Outside Design..... 33 F
 Winter Inside Design..... 70 F
 Summer Outside Design..... 82 F
 Summer Inside Design..... 78 F
 Summer Range..... 22 F
 Interior Shading Used..... No
 Exterior Shading Used..... No
 Overhang Shading Used..... No
 Latent Load Fraction..... 0.20

HEATING AND COOLING LOAD SUMMARY

| Description | Heating (Btuh) | Cooling (Btuh) |
|----------------------------------|-------------------|-------------------|
| Opaque Conduction and Solar..... | 12403 | 3429 |
| Glazing Conduction..... | 13907 | 1503 |
| Glazing Solar..... | n/a | 29701 |
| Infiltration..... | 15422 | 658 |
| Internal Gain..... | n/a | 2100 |
| Ducts..... | 4173 | 3739 |
| Sensible Load..... | 45906 | 41130 |
| Latent Load..... | n/a | 8226 |
| Minimum Total Load | 45906 | 49356 |

Note: The loads shown are only one of the criteria affecting the selection of HVAC equipment. Other relevant design factors such as air flow requirements, outdoor design temperatures, coil sizing, availability of equipment, oversizing safety margin, etc., must also be considered. It is the HVAC designer's responsibility to consider all factors when selecting the HVAC equipment.

DIRECTORY OF CERTIFIED CENTRAL FURNACES
 Updated 05/03/94 greater than 70,000 Btuh (FC2)

T D R (Energy Section)

Equipment Finder v2.3 User # EP1508

Selection Criteria:
 4 of 8378 Marked

10/31/94

| Brand | Model Number | Heating Output (Btuh) | Seas Eff (%) | Stdy State Eff (%) | APUE (%) | Cooling Capacity (Btuh) | Air Flow | F T | Add Date |
|---------|-----------------|-----------------------|--------------|--------------------|----------|-------------------------|----------|-----|----------|
| AAON | 227*-090-1*F-+3 | 135000 | 79.0 | 90.0 | 83.1 | 89000 | D | G | 8706 |
| CARRIER | 48LJD012511 | 144000 | 77.0 | 80.0 | 80.0 | 119000 | D | G | 9207 |
| YORK | D3CG102N13046 | 129000 | 72.9 | 80.0 | 79.0 | 102000 | H | G | 9302 |
| LUXAIRE | DDUC-W090N165 | 129000 | 72.9 | 79.0 | 79.0 | 87000 | H | G | 9004 |

DIRECTORY OF CERTIFIED STORAGE WATER HEATERS
 Updated 05/03/94 Natural Gas (WGS)

T D R (Energy Section)

Equipment Finder v2.3 User # EP1508

Selection Criteria:
 6 of 3452 Marked

10/31/94

| Brand | Model Number | Vol (gal) | Rec EF (%) | Eff Stndby (%) | Rated Input (Btuh) | Hght Ft | Wdth (in) | R16 | Date Added |
|--------------------------|---------------------|-----------|------------|----------------|--------------------|---------|-----------|-----|------------|
| SMITH, A. O. | BTC-154-**** | 85.0 | 0.00 | 78.0 | 154000 | G | 70 | | 8808 |
| AMERICAN WATER HEATER GP | DSIDASME270-100** | 95.0 | 0.00 | 80.0 | 270000 | G | 65 | | 9303 |
| SANH (U.S.) WATER HEATER | DSID270-100** | 95.0 | 0.00 | 80.0 | 270000 | G | 65 | | 9303 |
| SMITH, A. O. | BTC-240-**** | 95.0 | 0.00 | 80.0 | 240000 | G | 76 | | 8808 |
| SANH (U.S.) WATER HEATER | DCG31-100S270-6N | 95.2 | 0.00 | 80.3 | 270000 | G | 0 | | 9311 |
| RELIANCE | F-100-260-N*+*+**** | 95.4 | 0.00 | 80.8 | 260000 | G | 0 | | 9302 |