

MANUAL J/S Summary One summary sheet for each system

NOTE: The load calculation must be calculated on a *room basis*. Room loads are a mandatory requirement for making *Manual D* duct sizing calculations. ***All blanks must be filled in***

Design Information:

Project: _____ Location: Midway City, Utah

Design Conditions

	Htg	Clg		
Outside db (°F)	<u>5</u>	<u>91</u>	Altitude:	<u>min. 5550</u> ft.
Inside db (°F)	_____	_____	Entering wb (°F)	_____ °F
Design TD (°F)	_____	_____	(Assume 63°F unless there is ventilation air or significant duct leakage or heat gain)	

If design conditions used are not those listed in Table 1/1A Manual J please justify.

Infiltration:

Circle One:

Method: _____ Construction Quality: semi-tight or tight # Fireplaces (open fire box): _____

Summary:

Manual J Heat Loss: _____ BTUh Heating Fan: _____ CFM Htg Design TD: _____ °F
Manufacturer's Temperature Rise Range: _____ °F to _____ °F
Manual J - Sensible Gain: _____ BTUh Latent Gain: _____ BTUh Total Gain: _____ BTUh
Calculated SHR _____ Use SHR to determine cooling CFM/ton Cooling Fan: _____ CFM

Heating Equipment:

Furnace Manufacturer: _____ Model #: _____ AFUE: _____
Sea Level: Input: _____ BTUh Output: _____ Altitude Adjusted Output _____
Multi-stage: Yes No *If YES, provide altitude adjusted lowest Output* _____
If Adjusted Output is **greater than 1.4** times the Total Heating Load, please justify: _____

Cooling Equipment:

A/C Manufacturer: _____ Model #: _____ (_____ T) SEER: _____
Total Capacity: _____ BTUh Sensible Capacity: _____ BTUh Latent Capacity: _____ BTUh
Evap. Coil Manufacturer: _____ Model #: _____ (_____ T) Metering: Orifice _____ TXV _____
Actual SEER rating with selected coil, furnace and metering. SEER: _____
Attach manufacturer's data showing actual cooling capacity and actual SEER using these components.
If Cooling Capacity is **greater than 1.15** times the Total Cooling Load, please justify: _____

If you want to size equipment to include the future basement, I will approve this under these conditions: 1) insulate walls of basement 2) the system must be two-stage or multi-stage 3) minimum one supply and one return serving basement.

Manual J/S Summary- Instructions

The load information asked for on the summary must be taken from the actual load calculation completed on the project.

Project: *Identify project name, lot number- information that matches the plan submitted.*

Location: *The city or town must be reasonably close to actual location. Software used may not have the specific location in the database. **Use design conditions of 5-degrees and 91-degrees for Midway. Our base elevation for Midway is 5,600', some locations may be higher; see Google Earth.***

Outside Dry Bulb, Inside Dry Bulb: *Temperature data should be from Table 1 or Table 1A of ACCA Manual J. It is understood that there may be situations where a slight adjustment to this values is necessary. For example; there may be areas in the Salt Lake Valley where the low temperature is historically lower than the airport temperature. If values are adjusted- please justify the adjustment. Provide both heating (Htg) and cooling (Clg) design temperatures. If inside or outside design conditions listed are not the same values listed in Manual J, explain why the different values were used.*

Entering wb: *The entering wet-bulb represents the default value wet-bulb temperature across the evaporator coil. This will typically be 63°F (75°F dry bulb @ 50% relative humidity). A higher wb temperature will result from duct leakage, un-insulated duct or ventilation air- any condition that raises the return air temperature. Use this wb temperature when selecting cooling condenser from manufacturer's comprehensive data.*

Design TD: *TD-(temperature difference) - the temperature difference between inside and outside design temperatures.*

Infiltration: *Infiltration calculations are based on the Construction Quality. Version 7 of Manual J uses Best, Average or Poor to evaluate Infiltration. Version 8AE uses Tight, Semi-Tight, Average, Semi-Loose and Loose to evaluate. Version 8 goes into very specific detail for a more accurate number. Note method used on summary. Open firebox fireplaces that draw air from inside the home must be included, even if there is a 4" 'combustion air' flex bring air into the fireplace. Sealed, direct vent type fireplaces should not be counted. Methods include: **Simplified/Default Method**- taken from Table 5A; **Component Leakage Area Method**- calculating infiltration based on individual leakage points taken from Table 5C of Manual J8; or **Blower Door Method**, where the actual leakage is based on a blower door test on the home.*

Manual J Heat Loss: *This is the whole house winter heat loss taken directly from the completed attached Load Calculation. Load must account for all factors such as loss building components as well as loss through infiltration, ventilation, and duct losses.*

Heating Fan: *Heating airflow typically may be lower than cooling CFM. Adjusted to insure the temperature rise across the heat exchanger falls within the range specified by the manufacturer. Software will often do this calculation and provide a correct heating CFM. See Manual S Section 2-6-*
$$\text{Rise (°F)} = \text{Output Capacity} \div (1.1 \times \text{Heating CFM})$$

Manufacturer's Temperature Rise Range: *Range taken from manufacturer's performance data. Various manufacturers may certify ranges from 20 - 70°F.*

Manual J – Sensible Gain: *The whole house summer heat gain taken directly from the completed attached Load Calculation. Load must account for all factors including gain through building components, solar gain, infiltration, ventilation and ducts. Also includes the sensible internal gains from appliances and people.*

Manual J – Latent Gain: *The gains due to moisture in the air. Large latent load are typically from moisture migration into the home from outside in humid climates. People, cooking, plants, bathing and laundry washing can all add to the latent load in a home.*

Total Gain: *The combined total of the sensible and latent gain. May be referred to as Total Cooling Load.*

SHR- Sensible Heat Ratio: *Use to determine Cooling CFM per ton. The ratio of sensible heat gain to total heat gain. $SHR = \text{Sensible Heat Gain} \div \text{Total Heat Gain}$. Recommended air flows: If SHR is below 0.80 select 350 CFM/ton; if SHR is between 0.80 & 0.85 select 400 CFM; if SHR is greater than 0.85, select 450 CFM/ton.*

Cooling Fan: *Software used to perform the calculation will typically provide a minimum CFM based on the minimum required size of the equipment. This number may be adjusted to meet specific requirements of the home. Heating and Cooling CFM may or may not be the same. The cooling CFM should be around 450 CFM per ton of cooling in Utah's dry climates. If it is not, justify.*

Heating Equipment: *List specific equipment to be used. This information is not required on the Load Calculation documents, however it must be provided here to verify equipment sizing against calculated loads.*

AFUE: *The AFUE (Annual Fuel Utilization Efficiency) listed here will be compared to that listed on plans and on energy compliance documents (REScheck or other). It must also match the equipment actually installed in the home.*

Sea Level Input: *The listed input on the furnace label and in manufacturers' documentation. Input represents the total amount of heat in the gas at sea level.*

Heating Output: *The amount a heat available for discharge into the conditioned space. The input less any vent or stack losses, or heat that is carried out with the products of combustion. May be take from manufacturer's performance data or calculated using input and furnace efficiency.*

Altitude Adjusted Output: *This number is the actual output that will be attained after the furnace has been adjusted for efficiency and de-rated for altitude (typically 4% for every 1000' above sea-level, however 2% /1000' for many 90+ efficient furnaces). Some manufacturers may have different requirements- adjustments should be made per their requirements. Calculations should be attached. Example: 80,000 input 91% efficient furnace in Midway, with manufacturers' installation instructions specifying 4%/1000'. $80,000 \times .91 \times .80 = 58,240 \text{ BTUh}$.*

Multi-stage Furnace: *Multi-stage and modulating equipment is now available. When comparing to heating load calculated, use the maximum adjusted output to verify the furnace is large enough and the lowest output to insure it is not too large.*

Size Justification: *Example: If the Total Heating Load = 29954 BTUh. A furnace with an adjusted output larger than 45,000 BTUh ($29954 \times 1.5 = 44931$) would require an explanation justifying the size.*

Cooling Equipment: *List specific equipment to be used. Provide manufacturers comprehensive data for furnace, furnace blower and condenser, with capacities at design conditions highlighted.*

Condenser SEER: *This SEER (Seasonal Energy Efficiency Ratio) is the listed SEER for this model series, not the exact SEER with components used this system.*

Total Capacity: *Manufacturers base data is based on ARI Standard 210/240 ratings; 95°F outdoor air temperature, 80°F db/67°F wb entering evaporator. As the Design Conditions are different than this standard, refer to manufacturers expanded ratings for capacities at actual design conditions. Total capacity is the latent and sensible capacity at design conditions*

Sensible Capacity: *The sensible only capacity from the manufacturer's expanded data at design conditions.*

Latent Capacity: *The latent only capacity from the manufacturer's expanded data at design conditions. NOTE: One half of the excess latent capacity may be added to the sensible capacity.*

Sizing the Coil and Condenser: *Size the equipment from the heat loss and heat gain shown in your calculations. Do not use the default size at the SHR of .70 or .75 that Wrightsoft kicks out; this SHR is not for our climate, but for a moist, coastal climate like Florida.*

Evaporator Coil Make and Model #: *List the exact model number for the evaporator coil used this system. If coils from a different manufacturer than the condenser is used, provide data from both manufacturers verifying actual performance.*

Expansion/Metering: *Provide the specific metering used- orifice or TXV (thermostat expansion valve). If the manufacturer has several options, list the option used.*

Actual SEER rating: *Attach manufacturers' documentation or ARI report showing actual cooling capacity, and actual SEER using the components used this system. Indoor air handler/ furnace blower must be included in this documentation. Do not use ARI (ARHI) data for actual sizing.*

Size Justification: *If cooling capacity is 15% greater than the calculated Cooling load explain. High latent (moisture) loads can be listed here. Special requirements particular to the customer may also be noted here.*

Manual **D** Calculations and Summary:

Project: _____

Friction Rate Worksheet

Step 1) **Manufacturer's Blower Data**

External static pressure (ESP)= _____ IWC CFM = _____

Step 2) **Device Pressure Losses**

Evaporator Coil	_____
Air Filter	_____
Supply Register	<u>0.03</u>
Return Grill	<u>0.03</u>
Other Device	_____

Total device losses (DPL) _____ IWC

Step 3) **Available Static Pressure**

ASP = (ESP – DPL) _____ IWC

Step 4) **Total Effective Length (TEL)**

Supply-side TEL + Return-side TEL = (_____ + _____) = _____ Feet

Step 5) **Friction Rate Design Value (FR)**

FR = (ASP X 100) ÷ TEL = (_____ X 100) ÷ _____ = _____ (IWC/100')

This friction rate (FR) calculated in Step 5 is the rate to be used with a duct calculator or a friction chart for the duct design on this project.

Attach at a minimum, a one line diagram showing the duct system with fittings, sizes and lengths.